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INDIA RUBBER WORLD

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Volume 94 **New York, April 1, 1936** **Number 1**

Rubber Substitutes as Coatings for Balloon Fabrics[1]

Theron P. Sager [2]

IN ITS simplest form a balloon fabric consists of a closely woven cotton cloth coated with a material which serves to render it gas-tight. In common with all structural materials employed in lighter-than-air craft, emphasis is placed upon optimum properties—strength, durability, impermeability—per unit weight of the fabric. Because of the uncommon combination of necessary qualities, many of the readily available materials which have been suggested can not be utilized successfully as coating materials. In most cases they lack the essential flexibility. A balloon fabric must withstand an unavoidably rigorous treatment involved in handling—placement in the ship, inflation, deflation—without impairment of its strength or its gas-retaining ability. The problem of providing a suitable coating consists essentially in developing a material that will withstand severe flexure under varying conditions of temperature and humidity and which will be virtually impermeable to lifting gas. Work on this problem is being conducted for the Bureau of Aeronautics, Navy Department.

It is generally recognized that the mechanism of the passage of gas through a continuous film takes place by a process of solution and not of flow through small openings. The chemical composition of the film is then a largely controlling factor in determining the rate of permeation.[3] It is unfortunate that rubber, which so adequately meets the requirements of strength and flexibility, should possess an inherently high permeability to gases. Within relatively ineffective limits the permeability of rubber is little altered by variations in compounding or curing. One of the most effective means of lowering the permeability of rubberized fabric has been the simple expedient of adding a coating of paraffin wax. By this means it is possible to lower the permeability about 60%, but the accompanying increase in weight may be as much as 20%. Furthermore a film of paraffin wax lacks continuity and permanence. To afford the high degree of impermeability desired in gas cells, it has been customary to use, either as direct coatings or to supplement rubber coatings, films of hydrophilic materials. These include such substances as goldbeaters' skin, regenerated cellulose, and gelatin. All these substances are very impermeable to hydrogen and helium. In order to maintain such substances in a flexible condition it is necessary that they be allowed to absorb a certain amount of moisture. For this purpose a hygroscopic substance such as glycerol is added. The use of a hydrophilic material presents the disadvantage that it is subject to physical changes under varying atmospheric humidities. In high humidities it may become wet, and lose strength and adhesion to the fabric, and in prolonged exposure to high humidity there is danger of loss of glycerol by leaching. In low humidities such a material may shrink and become brittle.

EDITOR'S NOTE. Our readers of the rubber industry undoubtedly will be interested to know that the olefin polysulphide and polychloroprene referred to in this article are respectively Thiokol B and "DuPrene" (trade mark registered).

[1] Publication approved by the Director of the National Bureau of Standards of the U. S. Department of Commerce. Originally published in *Aeronautical Sciences*, Nov., 1935, pp. 63-65.

[2] National Bureau of Standards.

[3] T. P. Sager, "Permeability of Synthetic Film-Forming Materials to Hydrogen," *BS J. Research*, 13, 879 (1934) RP 750.

Other types of commonly employed coating materials, which include varnishes, cellulose derivatives, and a variety of synthetic resins, also present difficulties when applied to this problem. Aside from the fact that many of them are not particularly impermeable, they do not have the desired pliability. It is customary to increase the flexibility of varnishes by including a non-drying or semi-drying oil in their composition. To cellulose derivatives and synthetic resins, liquids of low vapor pressure, referred to as plasticizers, are added. For a number of purposes such coatings are satisfactory, but in attempting to apply them to balloon fabrics, the large amount of plasticizer added to obtain flexibility tends to produce excessive tackiness. Furthermore, these materials are characterized by extensibility but are not capable of corresponding retraction.

While rubber is a material which is unique in its combination of great strength and elastic extensibility, it is deficient in certain properties, which renders it unsuitable for many purposes. One of these properties is its lack of resistance to the swelling action of mineral oils. The necessity of obtaining a material which is superior to rubber in this respect has led to the development of a number of synthetic rubber-like materials. Thus the treatment of vinylacetylene with hydrogen chloride yields chloroprene, having the formula $CH_2 = C\ (Cl) - CH = CH_2$. This substance has a high rate of polymerization and yields a material whose properties more closely approach those of rubber than any material hitherto produced. An analogous material, vinyl chloride, having the formula $CH_2 = CHCl$, is capable of a high degree of polymerization and yields rubber-like gels when suitably plasticized. Both of these materials are much less permeable to hydrogen than is rubber. Apparently, the effect of the introduction of a halogen group in an unsaturated hydrocarbon is to reduce its permeability to hydrogen. An example of this is rubber itself. When rubber is treated with hydrogen chloride, it is possible to obtain what is known as rubber hydrochloride which differs materially from rubber but still retains some extensibility. This material has a much lower permeability to hydrogen than has rubber.

Another type of rubber-like material is that resulting from the interaction of olefin derivatives and alkaline polysulphides. These substances are presumably made up of chains which in their simplest form contain the unit $—CH_2—S—S—CH_2—$. These materials have decidedly rubber-like properties and are highly resistant to the swelling action of mineral oils.

Of still another type is the flexible alkyd resin. The flexible properties of materials of this type are interesting because they are composed of long-chain molecules resulting from the esterification of a dihydric alcohol, e.g. glycol succinate, which are attached through primary valence linkages to branched chain molecules formed by the esterification of trihydric alcohols, e.g. glyceryl phthalate. Both of these types of materials exhibit a low permeability to hydrogen.

The permeabilities to hydrogen of these materials are given in Table 1. Except in the case of rubber hydrochloride the samples tested represented balloon cloth coated with the respective materials. The value for rubber represents that obtained on rubberized gas-cell fabric not coated with paraffin wax. The permeabilities are expressed as cubic feet per square yard per twenty-four hours and the weights as ounces per square yard. The product of the weight and permeability is included as a means of comparing the relative permeabilities. Hydrogen is usually employed in measuring the permeability of balloon fabric. In the case of rubber the permeability to helium is less than to hydrogen, the average ratio of permeabilities, helium to hydrogen, being 0.65. The value of this ratio for materials other than rubber has not been determined in every case. A few measurements made on polychloroprene and olefin polysulphide given in Table 2 indicate that not only is the permeability to helium of these materials less than to hydrogen but the ratios of permeabilities, helium to hydrogen, are also in close agreement with that of rubber.

The permeabilities of the rubber-like materials listed herein are all of a sufficiently low order to merit consideration. From the standpoint of balloon fabric construction, numerous factors other than relative permeability enter into the question of the suitability of a coating material. For this reason the relative utilities of the materials listed in Table 1 are not necessarily indicated by the relative permeabilities. Discussion of the physical properties of some of these materials will be found in the references given in footnotes[4-7]. All of these materials have valuable application in other fields. Several of them present distinct advantages over previously developed coating materials for balloon fabrics.

Balloon fabrics coated with olefin polysulphide and polychloroprene have been prepared successfully in factory production by methods customarily employed in preparing rubberized fabric. Both materials apparently have good aging properties as determined by laboratory tests. Information in regard to service tests of envelopes and cells constructed of these materials is not yet available. The olefin polysulphide film has a remarkably low permeability per unit weight, ranking closely in this respect with many of the hydrophilic materials. This property renders it particularly attractive for gas-cell construction. While this material has rubber-like qualities, its tensile strength is not as high as that of rubber. This causes difficulty in connection with seaming, it being desirable to seam balloon fabrics with cement. Among methods which have been attempted to overcome this difficulty, the use of rubber cement or combinations of rubber and olefin polysulphide appear for the present to be the most feasible.

TABLE 1
Permeabilities to Hydrogen

Material	Permeability at 1 Atm. Ft.³/Yd.²/24 Hrs.	Weight of Coating Oz./Yd.²	Permeability × Weight Ft.³/Yd.²/24 Hrs. × Oz./Yd.²
Rubber hydrochloride*	0.059	1.1	0.064
Olefin polysulphide	.017	3.5	.059
	.020	3.0	.060
	.023	2.9	.066
Flexible alkyd resin varnish	.026	3.6	.093
Polyvinyl chloride	.165	3.3	.544
Polychloroprene	.073†	5.7	.416
	.174	3.6	.626
Rubber	.678	2.6	1.762

*Film not supported by fabric.
†Two-ply fabric.

TABLE 2
Permeabilities to Hydrogen and Helium

Material	Permeability to Helium at 1 Atm. Ft.³/Yd.²/24 Hrs.	Permeability to Hydrogen at 1 Atm. Ft.³/Yd.²/24 Hrs.	Ratio of Permeabilities Helium to Hydrogen
Polychloroprene	0.047	0.073	0.64
	.106	.165	.64
Olefin polysulphide	.006	.009	.66
	.011	.017	.64
	.014	.023	.60

[4] "Preliminary Compounding Information on Thiokol B," Bulletin IB, Thiokol Corp., Yardville, N. J.
[5] E. R. Bridgwater, "Physical Properties of DuPrene Compounds," *Ind. Eng. Chem.*, 26, 33 (1934).
[6] S. L. Brous and W. L. Semon, "Koroseal, a New Plastic," *Ind. Eng. Chem.*, 27, 667 (1935).
[7] R. H. Kienle and P. F. Schlingman, "Flexible Alkyd Resins," *Ind. Eng. Chem.*, 25, 971 (1933).

Gaskets[1]

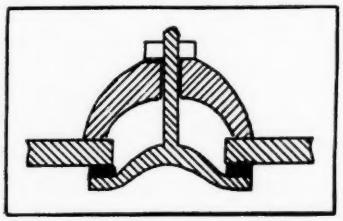
An Attempt Is Made to Classify Gasketed Joints by Types, and to Indicate the Materials and Constructions Employed in Modern Gaskets for the Various Types of Joint and for the Various Fluids Handled through These Joints

F. C. Thorn [2]

A GASKET may be defined as a nonrigid element between two rigid parts of a fluid container, which serves to make fluid-tight the joint between them. Since a process industry generally involves the passage of fluids through containers, the gasket necessarily looms large in its bill of materials. As such it is deserving of more engineering attention than it has received.

The oldest historically and the simplest gaskets were plastic masses stuffed into crevices more or less haphazardly, but serving their purposes with a fair degree of effectiveness. Included in these are oakum (the old reliable remedy for leaky wooden ships), the familiar red lead of the plumber, and the daub of rubber cement which seals the humble tin can. From these to some of the elaborate fabricated gaskets of today is a far cry.

The modern gasket is one member of a triumvirate which includes, in addition, the flanges shaped to accommodate it and the means provided for forcing them into contact with the gasket. The more perfectly these other members perform their function, the less work the gasket has to do. Too often, unfortunately, the gasket is forced to bear the brunt of defective joint design.



Boiler Gasket, a Self-Energized Joint

Flat Gasketed Joints

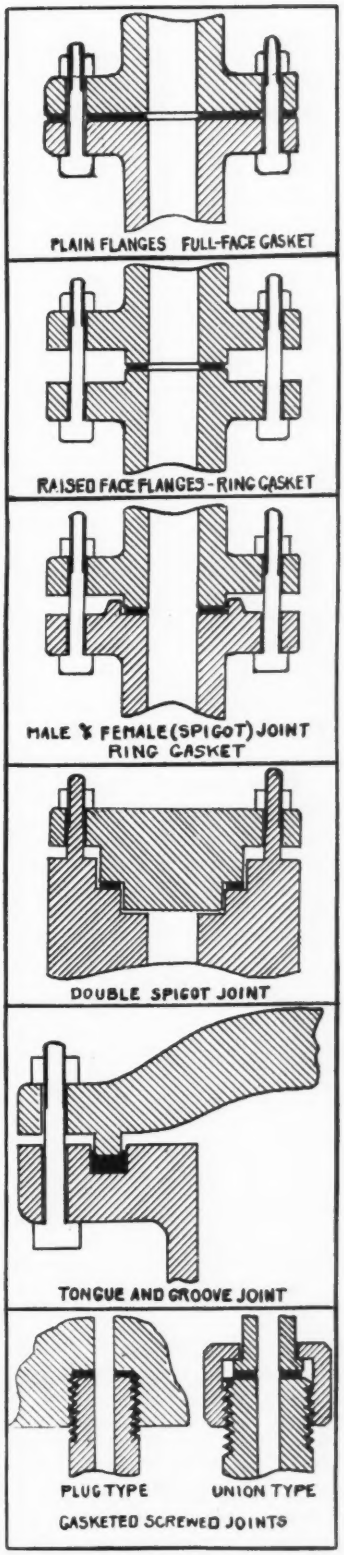
The simplest as well as the commonest joint is composed of a flat gasket mounted between flanges and held together by a ring of bolts or some similar arrangement. Examples are shown in the accompanying illustration. A fairly complete list of the materials which have been used for gaskets in this type of joint include the following:

A. Paper (matted fibers produced by wet screening)
- I. Vegetable fiber
  - **a.* Untreated *b.* Treated
    - **1.* With glycerol or combinations of glycerol with gelatin, etc. (so-called fiber sheet)
    - *2.* With rubber compounds introduced (as compounded latex) into the beater, or applied (as latex or solution) to the finished sheet
    - *3.* With oils, resins, cellulose esters, "DuPrene," Thiokol, etc.
    - *4.* With zinc chloride ("vulcanized" fiber)
- II. Asbestos fiber
  - *a.* Untreated (asbestos paper and millboard)
  - *b.* Treated, with rubber, oils, etc.

B. Felt (matted fibers produced by dry carding or by a similar process)
- I. Animal fiber (wool felt, etc.), treated or untreated
- II. Vegetable fiber (cotton lap), generally treated with rubber cement
- III. Asbestos fiber, generally treated with rubber cement

C. Woven fabrics (which may be single-ply, superimposed plies, built up from folded or rolled strips, or prepared by flattening braided or woven tubing)
- I. Vegetable fiber yarn (generally cotton)
  - *a.* Untreated *b.* Treated
    - **1.* With rubber compounds, either by dry "frictioning" or "skimming," or as a latex or solution ("cotton insertion" sheet, etc.)
    - *2.* With oils, varnishes, lacquers, "DuPrene," Thiokol, etc., applied either by dry or wet methods.
- II. Woven from asbestos yarn (which may or may not be reenforced with wire)
  - *a.* Untreated **b.* Treated (as described under section *CIb*)
- III. Woven from wire, generally surfaced with rubber ("wire inserted" sheet)

D. Metal (in forms other than woven wire)
- **I.* Solid (soft steel copper, lead, etc.)
- **II.* Corrugated sheet, with or without asbestos fiber in corrugations
- **III.* Perforated sheet (generally with asbestos fiber pressed into perforations)
- **IV.* Applied as outer jacket over core of asbestos paper, etc.



Flange Joints

[1] Abstracted from *Ind. Eng. Chem.*, Feb., 1936, pp. 164-170.
[2] Garlock Packing Co., Palmyra, N. Y.

*V. In form of narrow strips assembled on edge, with intervening plies of asbestos paper

E. Pure plastics (not incorporated into any of the preceding types of prefabricated backing)

I. Rubber (generally vulcanized)

**a.* Compounded with powdered fillers only, or with none (rubber sheet, etc.)

**b.* Compounded with fiber, generally asbestos ("compressed asbestos sheet")

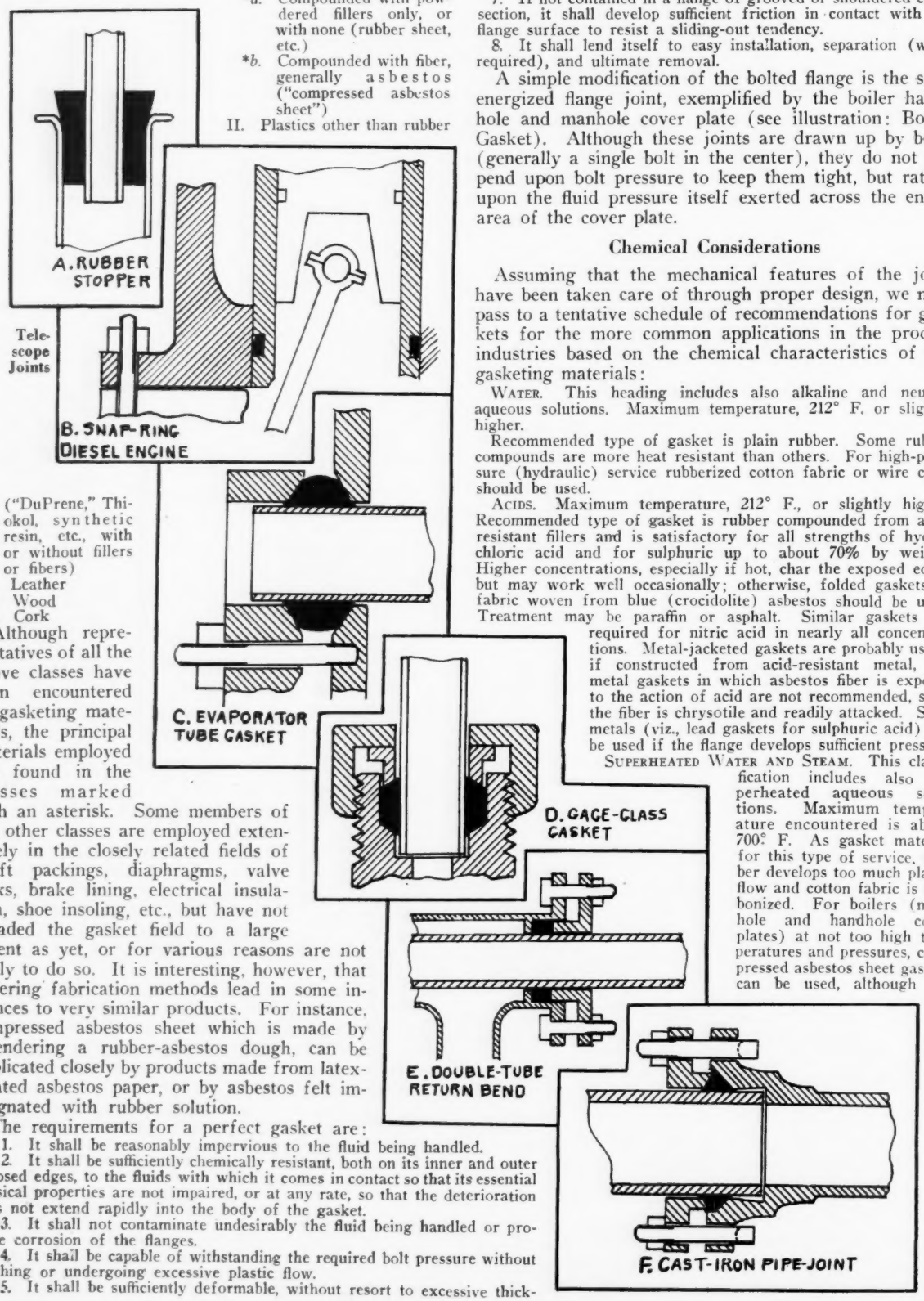
II. Plastics other than rubber ("DuPrene," Thiokol, synthetic resin, etc., with or without fillers or fibers)

F. Leather

G. Wood

**H.* Cork

Although representatives of all the above classes have been encountered as gasketing materials, the principal materials employed are found in the classes marked with an asterisk. Some members of the other classes are employed extensively in the closely related fields of shaft packings, diaphragms, valve disks, brake lining, electrical insulation, shoe insoling, etc., but have not invaded the gasket field to a large extent as yet, or for various reasons are not likely to do so. It is interesting, however, that differing fabrication methods lead in some instances to very similar products. For instance, compressed asbestos sheet which is made by calendering a rubber-asbestos dough, can be duplicated closely by products made from latex-treated asbestos paper, or by asbestos felt impregnated with rubber solution.



The requirements for a perfect gasket are:

1. It shall be reasonably impervious to the fluid being handled.
2. It shall be sufficiently chemically resistant, both on its inner and outer exposed edges, to the fluids with which it comes in contact so that its essential physical properties are not impaired, or at any rate, so that the deterioration does not extend rapidly into the body of the gasket.
3. It shall not contaminate undesirably the fluid being handled or promote corrosion of the flanges.
4. It shall be capable of withstanding the required bolt pressure without crushing or undergoing excessive plastic flow.
5. It shall be sufficiently deformable, without resort to excessive thickness, to distribute the applied pressure fairly evenly over the flange surface, compensating for any irregularities.
6. It shall be sufficiently elastic to maintain at least a portion of the applied pressure in the face of such joint movements as are not fully eliminated by the joint design.
7. If not contained in a flange of grooved or shouldered cross section, it shall develop sufficient friction in contact with the flange surface to resist a sliding-out tendency.
8. It shall lend itself to easy installation, separation (when required), and ultimate removal.

A simple modification of the bolted flange is the self-energized flange joint, exemplified by the boiler handhole and manhole cover plate (see illustration: Boiler Gasket). Although these joints are drawn up by bolts (generally a single bolt in the center), they do not depend upon bolt pressure to keep them tight, but rather upon the fluid pressure itself exerted across the entire area of the cover plate.

Chemical Considerations

Assuming that the mechanical features of the joint have been taken care of through proper design, we may pass to a tentative schedule of recommendations for gaskets for the more common applications in the process industries based on the chemical characteristics of the gasketing materials:

WATER. This heading includes also alkaline and neutral aqueous solutions. Maximum temperature, 212° F. or slightly higher.

Recommended type of gasket is plain rubber. Some rubber compounds are more heat resistant than others. For high-pressure (hydraulic) service rubberized cotton fabric or wire cloth should be used.

ACIDS. Maximum temperature, 212° F., or slightly higher. Recommended type of gasket is rubber compounded from acid-resistant fillers and is satisfactory for all strengths of hydrochloric acid and for sulphuric up to about 70% by weight. Higher concentrations, especially if hot, char the exposed edges but may work well occasionally; otherwise, folded gaskets of fabric woven from blue (crocidolite) asbestos should be used. Treatment may be paraffin or asphalt. Similar gaskets are required for nitric acid in nearly all concentrations. Metal-jacketed gaskets are probably usable if constructed from acid-resistant metal, but metal gaskets in which asbestos fiber is exposed to the action of acid are not recommended, since the fiber is chrysotile and readily attacked. Solid metals (viz., lead gaskets for sulphuric acid) can be used if the flange develops sufficient pressure.

SUPERHEATED WATER AND STEAM. This classification includes also superheated aqueous solutions. Maximum temperature encountered is about 700° F. As gasket material for this type of service, rubber develops too much plastic flow and cotton fabric is carbonized. For boilers (manhole and handhole cover plates) at not too high temperatures and pressures, compressed asbestos sheet gaskets can be used, although the

rough condition of the flanges generally requires a more compressible gasket. Gaskets of folded asbestos cloth construction with a heat-resistant rubber cement are widely used and are recommended if the unit pressures and temperatures are not too high. The best narrow flange boiler handhole gaskets of this type are made from folded lengths of rubberized seamless-woven asbestos tubing. Metal gaskets of the jacketed type and of the type constructed from strips on edge are also widely used, especially for the higher range of temperatures and pressures.

For bolted pipe flanges, folded asbestos fabric gaskets are somewhat lacking in crushing strength; furthermore the flanges are accurate enough to permit a thinner and less compressible gasket. Compressed asbestos sheet is the most widely used material, although, with the advent of higher steam temperatures, there has been a drift in the direction of metal gaskets of the corrugated, jacketed, and strip-on-edge types. (The newer type of perforated metal-asbestos-paper gasket appears to have been employed so far principally for automobile cylinder heads, where it competes successfully with the jacketed gasket in withstanding both hot water and oil.)

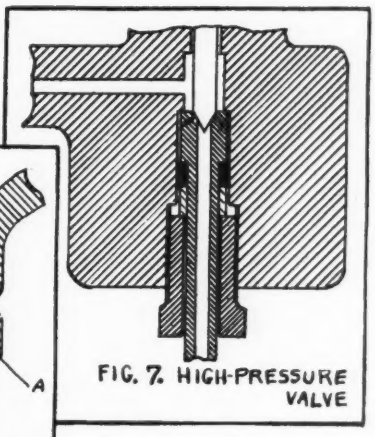


FIG. 7. HIGH-PRESSURE VALVE

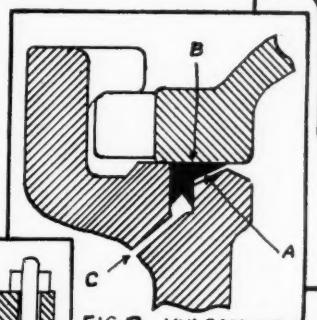


FIG. 8. VULCANIZER DOOR

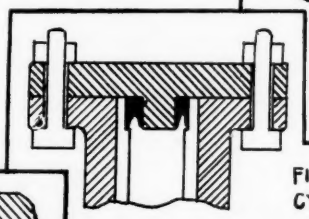


FIG. 9. HYDRAULIC CYLINDER

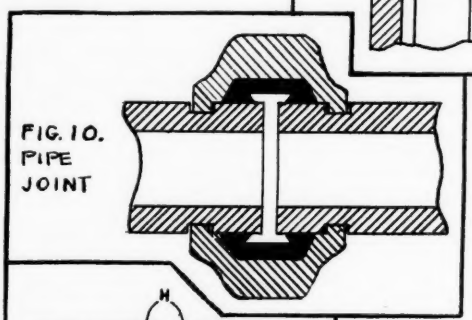


FIG. 10. PIPE JOINT

Self-Energized Joints

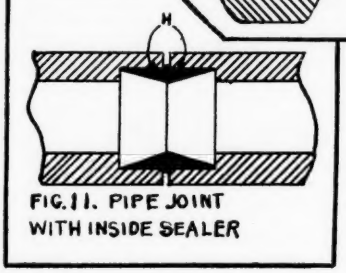


FIG. 11. PIPE JOINT WITH INSIDE SEALER

Sulphite digesters are packed in the same way as boilers, using folded gaskets or compressed asbestos sheet, with the additional requirement that the rubber compound must be acid-resistant (the acid is not strong enough to require the use of blue asbestos). Metal gaskets, especially of chrome-nickel steel, are also widely used.

Large bolted flanges for hot water or steam service are frequently packed with a flat folded rubberized asbestos fabric tape which is spliced in the field to make a gasket of the required diameter. A somewhat similar tape is made from flattened braided tubing. Where a very compressible gasket is required to compensate for flange warping, etc., a tongue-and-groove construction is generally used with a thick gasket, folded or rolled up from a strip of rubberized asbestos fabric, placed in the bottom of the groove.

Alcohol, Glycerol, Acetone. This heading also includes other organic liquids with a slight swelling action on rubber. Maximum temperature, 212° F. approximately. As a gasket material, rubber is usable, except that extracted resins may contaminate the fluid. Organic acids (such as acetic) impose the additional requirement that the rubber compound shall contain only acid-resistant fillers.

Mineral Oils, Etc. This heading includes also tar, creosote, vegetable oils, fatty acids, etc. Maximum temperature, 700° F. For the gaskets, pure rubber compounds (unless of the hard variety which is not suitable for gasketing) generally swell too much or are weakened, or both, in this type of service, especially if the temperature is elevated. "DuPrene" compounds are more resistant than rubber compounds of equivalent hardness and are finding applications in this field. In the higher temperature ranges fairly satisfactory results are obtained with certain types of compressed asbestos sheet, or, where a more compressible gasket is required, with folded or rolled asbestos fabric constructions containing a binder of highly oil-resistant rubber compound. Untreated asbestos paper is also used.

For temperatures below 212° F. and low pressures, cork or vegetable fiber sheet is quite satisfactory and largely used for such applications as automobile crank cases, etc. At high temperatures they dry out and shrink.

Metal gaskets of all the compressible types can be used against oils of any temperature where the oil contains nothing that will attack the metal. For high-sulphur mineral oils it is necessary to avoid copper alloys; aluminum is widely used for this service. Solid metals can be used where the flanges are designed to develop the necessary pressure.

Gasoline, Etc. This classification comprises also benzene, turpentine, chlorinated solvents, etc., including wet natural or manufactured gas, or refrigerant gases (Freon, methyl chloride, etc.) carrying a condensed refrigerant. Maximum temperature, 212° F. In this service, rubber (except hard rubber) swells badly and is weakened. Advantage is taken of the swelling of rubber to seal rough flanges where the joint is not opened, but even in these cases the edges crumble badly. Performance is better with compressed asbestos sheet and constructions of rubberized fabric, especially if the rubber compound is of a solvent-resistant type. "DuPrene" is decidedly better than most rubber compounds against gasoline, Freon, and some other solvents, but shows little advantage against certain other types of solvent. Thiokol is practically indifferent to solvents (except carbon disulphide), but its plastic flow is a troublesome feature although it can be overcome to a large extent by fabric or wire reenforcement. Cork and vegetable fiber sheet can be used where pressures and temperatures are low. Metal gaskets of all kinds can be used, although it is sometimes difficult to hold back liquid solvents because of their mobility. Metal gaskets of copper alloys must be avoided in contact with liquid ammonia.

Hot oils and solvents represent the fields in which the weakness of rubber or rubber-bonded gaskets is most apparent, and the need for suitable substitutes is most keenly felt. It cannot be said, however, that wholly satisfactory materials have been found, taking into consideration both chemical and mechanical properties, although a wide variety of nonrubber gasketing materials are finding limited application.

Air and Dry Gases. The temperature should not exceed 700° F. Standard gaskets are the same as for water and steam—plain rubber for low temperatures, and compressed asbestos sheet or folded asbestos fabric for high temperatures, with metal gaskets optional for either service. Rubber compounds must be selected with care for compressed oxygen service since some of them are spontaneously inflammable. Air, oxygen, nitrogen oxides, ozone, and the halogens convert the exposed edges of rubber or rubber-bonded gaskets to a brittle resin, but the action does not penetrate the interior of the gasket very rapidly.

Liquid Chlorine and Bromine. At any temperature these materials attack vigorously any organic binder, even paraffin. The writer knows no fibrous gasket which is satisfactory against either of these materials, although it has been claimed that asbestos paper treated with certain types of asphalt paint has been used successfully against bromine. If the materials are anhydrous, certain metal gaskets can probably be used successfully.

Telescope Joints

The flat flange joint by no means exhausts the field of gasketed joints. In another common type the sealing

surfaces are not developed into flanges at right angles to the axis of the container, but are cylindrical and parallel to it. As the parts to be joined "telescope" into one another, a generic name for this type of joint might be "telescope joint." Examples are shown in the illustration: Telescope Joints.

In Figures *A* and *B* of the illustration: Telescope Joints, gasket pressure is derived solely from the initial deforming stress, together with any slight swelling pressure that might arise from contact of the gasket with the fluids being handled. In *C* to *F*, packing is contained in a stuffing box and compressed by a gland. The construction differs in no respect from that used in connection with shaft or rod packings, except that the parts do not move to any extent, and no lubrication need be provided. The mechanics of the telescope joint differ from those of flange joint in three important particulars:

1. The initial gasket pressure is developed at right angles to the direction of the bolt load, from which it follows that the gasket must be of a type that will function as a more or less perfect fluid.
2. Owing to the great thickness of the gasket and the consequent increase of elastic recovery, it must be assumed that at least a portion of the fluid pressure is carried by the bolt circle. Fluid pressure, however, applies only to the annular cross section occupied by the gasket. There is no way by which the fluid pressure over the central area can be carried by the joint except through the development of shearing stresses in the gasket which are not only destructive to the gaskets but probably ineffective. It follows that other means must be provided to carry the fluid pressure, which generally means that the end members of a series of such joints must be arranged to support the fluid thrust. The container walls in this case are not under longitudinal tension.
3. The complete absence of metallic connection between the rigid members makes possible, if the clearances at either end of the stuffing box are not too close, considerable angular misalinement, and also a certain amount of longitudinal push-and-pull movement which is absorbed by a kind of rolling action in the gasket. These advantages explain the growing popularity of the telescope type of joint as compared with the flange joint which requires rigid alinement and freedom from joint movement. If the longitudinal joint movement attains an amplitude sufficient to cause sliding with the gasket, the joint ceases to be a gasketed joint and becomes a regular slip joint. Often, however, as in pipe joints, the surfaces are not smooth enough to permit sliding movement without destruction of the gasket, in which case the joints should be protected by suitably located slip joints, such as are necessary when joints of the flange type are employed.

Space is lacking to enumerate all the applications of the telescope joint and the factors which govern the selection of gasket materials for it. The general recommendations outlined for flange joints are applicable here, with the exception that all constructions are eliminated which are incapable of transmitting pressure at right angles. This practically limits available materials to rubber, "DuPrene," or Thiokol compounds, alone or as elements in rolled or folded fabric constructions. Some of the important applications are as follows:

1. Snap rings for Diesel and other types of engine with replaceable cylinder liners. Fairly soft round rubber rings are largely used and function well, probably owing to swelling pressure derived from traces of oil reaching the gasket. For similar rings employed as packing around valve cages where the temperatures are higher, special oil-resistant rubber compounds and "DuPrene" are used to advantage.
2. Evaporator-tube gaskets and double-tube connections (generally rubber) with asbestos fabric constructions for high temperatures and pressures.
3. Gage glass washers, a particularly troublesome application because of large clearances at the top and bottom of the stuffing box occasioned by the use of undersize glass tubing. Rubber is the chief reliance, but asbestos fabric constructions may be used to advantage for high temperatures and pressures.
4. Pipe joints. These take two general forms: (1) sleeve couplers for use with plain-end pipe and (2) modified bell-and-spigot joints for cast pipe. The use of both kinds of joint is extending rapidly, owing to their great flexibility and ease of assembly. Plain rubber rings were largely used at first, but there is an increasing tendency to provide the rings with fabric or metal reenforcement across the clearances at top and bottom of the stuffing box, both to protect the rubber from the action of solvents in manufactured gas service, and more generally to restrain undesirable plastic flow of rubber compounds through the clearances.

On some fabric-tipped rings for solvent service, a protective layer of Thiokol is used to advantage. For high-temperature service, gaskets of rolled asbestos fabric construction are sometimes used.

The self-energized principle can also be employed with the telescope joint as evidenced by Figure 7. Initial gasket pressure is supplied by a nut, but thereafter the joint is self-sealing against all pressures. This joint differs from the usual telescope joint in that the entire fluid pressure is supported by the gland.

Cup-Packed Joints

The survey of gasketed joints would not be complete without reference to a class of self-energized joints which might be described broadly as "cup-packed." Figure 8 shows a cup packing applied to a flange joint on an autoclave door of the quick-opening or "bayonet" type. The cup principle depends on the development of a differential between the full fluid pressure at *A* and a diminished pressure at *B*. As the diminished pressure at *B* assumes that some sealing-off of pressure has already occurred, it follows that mechanical means must be employed to force the cup into initial contact. This is accomplished by admitting fluid pressure by a valve into area *C*. This type of joint is used principally for rubber vulcanizers, but there seems to be no reason why it could not be extended to other applications.

Figure 9 shows a cup packing used as a gasket to prevent water pressure in a hydraulic cylinder from reaching the space between the cylinder liner and the main casting. The cup is preferred in this case to a flat gasket across the end of the liner because of the thinness of the latter.

Figure 10 shows a well-known form of pipe joint which depends on the cup principle. Here, as well as in Figure 9, initial lip pressure is secured by a slight deformation of the cup from its original dimensions. Figure 11 indicates a similar application of a double-cup gasket to the inside of the joint.[3] Best results are obtained if means are employed to lift the heel, *H*, away from the surface. The selection of materials for cup packings calls for considerable judgment, because the cups are quite exposed to the fluid being handled and yet are required to maintain their flexibility over considerable periods. No general rules can be laid down, since each case has to be considered as special.

Gasket Pastes

To complete the study of gasketed joints would necessitate some reference to the type of material referred to in the opening paragraphs—the plastic paste or "joint compound." Considered as gasketing materials in themselves, they are not particularly important, since they are largely limited to improving certain nongasketed metal-to-metal contacts such as pipe threads, etc. The largest single use in this connection is probably the cemented or leaded bell-and-spigot joint for cast-iron pipe, which, as was previously pointed out, is suffering considerably in competition with the prefabricated rubber gasket. An important question arises, however, in connection with the value of joint compounds as an auxiliary to manufac-

(*Continued on page* 43)

[3] The patented "wave ring" gasket (described in Tongue's "High Pressure Design," 1934) depends on this principle.

Synthetic Plastics[1]

Commercial Progress and New Fields of Application

RUBBER is the king of plastics when considered from the points of view of the years of practical application, volume consumed, the variety of its inherent properties, and the tremendous and ever-increasing number of its indispensable uses. Notwithstanding all this, however, the rubber industry has experienced at one time both benefit and competition from the ambitious young industry, Synthetic Plastics, that has assumed such important proportions during the past decade.

Rubber manufacturers will be interested in this article, first, because of the assistance it may give in their problem of determining whether or not to turn available plant capacity to the manufacture of synthetic plastic items; and second, to obtain some knowledge regarding the scope and direction of the activities of this new industry for prognosticating the bearing it may have on the future of certain rubber applications.

PLASTICS' PROGRESS

Tumults of six murderous years have distracted general attention from the dramatic rise of a new industry —plastics. Perhaps a reason for public ignorance on the subject is the difficulty of translating into common terms the mysterious ways in which chemical processes move, their wonders to perform. Certainly this development rates popular stories of the "modern miracle" type, illustrated by figures symbolizing commercial research holding test tubes (usually by the wrong end).

On a hundred fronts synthetic materials are moving in determined competition with such originals as steel, copper, lumber, glass, rubber. Indoors, plastics are found in furniture, wall panels, builders' hardware, electric fixtures, ash trays, clocks, and thousands of gadgets. Outside they serve in decorative store fronts, automobile parts, safety glass, etc. Buttons and costume jewelry bring them into the field of personal adornment. Their use in plant equipment is steadily growing.

Plastics start prosaically from such commodities as cotton or wood fibers, coal derivatives. They pass through succeeding transmigrations, under jaw-breaking chemical names. Even formless gases are solidified into products as hard as some metals. Such materials have long been sought by industry. They have lustrous, permanent finish in colors; resist heat, cold, acids; don't readily conduct heat or electricity; are easily molded or worked into any design; combine with other materials; are light in weight; are often strikingly beautiful.

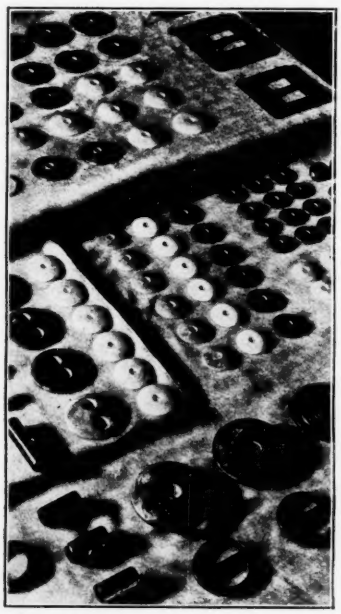
Radio, Motors Aid Boom

Research immediately after the war gave plastics an extra boost. Twenty-five years ago they were being used for insulation in the electrical industry. A big field developed later in radio parts, where their non-conducting qualities made application ideal. Plastics were early used in automobile manufacture. About 1929 molders began making containers, bottle caps, non-breaking dishes, cups, etc. These remain a big market. Automobile uses have steadily broadened. Cellulose acetate sheets are employed for laminated safety glass on most cars. Decoratively, plastics go into knobs and body accessories; functionally,

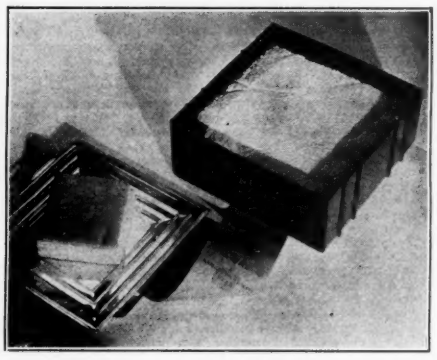
[1] Reprinted from *Business Week*, "Plastics' Progress," Dec. 21, 1935, pp. 16-19; "New Jobs for Plastics," Dec. 28, 1935, pp. 16-18.

Plastics' Big Push

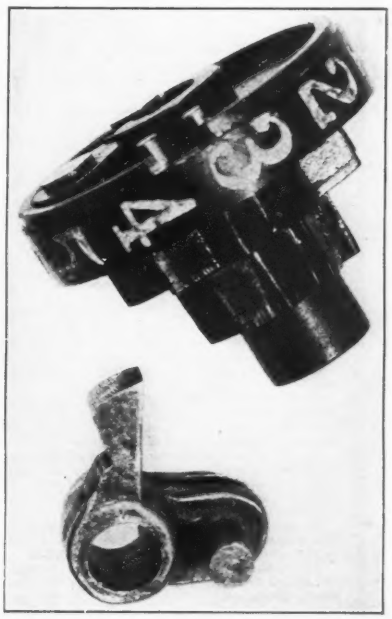
Plastics find new fields daily. Buttons and buckles (left). In fact, almost any form in any color may be produced by the cast phenolic resin process. Tough, durable, good-looking, these buttons are advancing at the expense of bone, pearl, and other natural materials, also are pushing past other synthetic buttons, made of casein. Durez cake boxes (below) are bringing fruit cake and plastics together in a holiday partnership. And when it comes to endurance, metal has nothing on some of the molded Bakelite wheels, one of which is shown (right) after 59 million impacts with a metal pawl.



Bourke-White



General Plastics



Modern Plastics

PRINCIPAL PLASTIC MATERIALS, MAKERS, AND APPLICATIONS

Chemical Classification and Forms in Which Available	*Principal Trade Name*	*Manufacturer*	*Principal Uses (Not All-Inclusive)*
1—Pyroxylin (Nitro-cellulose) sheets, rods, tubes (transparent, translucent, opaque or mottled; any color)	Celluloid	Celluloid Corp.	Sheets for printing, laminating, forming; toys, photographic film, combs, hair ornaments, shoe parts, costume accessories, handbags, toiletware, pens, pencils, curtain lights, handles
	Fiberloid	Fiberloid Corp.	
	Nixonoid	Nixon Nitration Works	
	Pyralin	Du Pont Viscoloid Co., Inc.	
2—Cellulose Acetate sheets, rods, tubes; molding compounds; wrapping tissues (transparent, translucent, opaque or mottled; any color)	Fibestos	Fiberloid Corp.	Shatter proof glass, window lights, Cel-O-Glass, lamp shades, automotive accessories, watch and clock crystals, optical instruments, electrical parts, combs, toiletware, non-flam photographic film, wrapping tissue, pens, pencils, records, knobs, handles
	Lumarith, Protectoid	Celluloid Corp.	
	Masuron	John W. Masury & Son	
	Nixonite	Nixon Nitration Works	
	Plastacele	Du Pont Viscoloid Co., Inc.	
	Tenite	Tennessee Eastman Corp.	
3—Protein (including Casein) rods and sheets (translucent, opaque or mottled; any color)	Ameroid	American Plastics Corp.	Buttons, buckles, dress accessories
	Aladdenite	Aladdenite Co., Inc.	
	Ronyx	Resinox Corp.	
	Soy Bean Deriv.	Ford Motor Co.	
4—Vinyl Resins sheets, molding compounds, etc. (transparent, translucent, opaque or mottled; any color)	Vinylite	Carbide & Carbon Chem. Corp.	Thin sheet (uses similar to pyroxylin) dentures, phonograph records, laminating, etc.
5—Urea Resins molding compounds (translucent or opaque; any color)	Beetle	American Cyanamid Co.	Table and kitchen ware, containers, buttons, closures, cases (for clocks, radios, scales), automobile accessories, toys, handles, knobs, electrical fixture parts
	Plaskon	Toledo Synthetic Products Co.	
	Unyte	Unyte Corp.	
	Makalot	Makalot Corp.	
6—Phenolic Resins molding compounds (usually opaque, chiefly dark colors and black)	Bakelite	Bakelite Corp.	Electrical parts, automotive parts, closures, containers, smokers' accessories; instrument, machine and appliance parts; cases and housings, knobs, handles, buttons, hardware, toys and games, table and kitchen ware, displays, novelties, decorative items; chemically-resistant parts
	Durez	General Plastics, Inc.	
	Durite	Stokes & Smith Co.	
	Indur	Reilly Tar & Chem.	
	Haveg (see note)	Haveg Corp.	
	Makalot	Makalot Corp.	
	Resinox	Resinox Corp.	
	Textolite	General Electric Co.	
7—Phenolic Resins cast forms (transparent, translucent, opaque or mottled; any color)	Bakelite	Bakelite Corp.	Costume accessories, including buttons, buckles and jewelry; toiletware, containers, cases, desk accessories, automobile parts, cutlery and hardware handles and knobs, picture frames, lamps and lighting fixture parts, umbrella handles, panels, trays, novelties, games
	Catalin, Prystal	American Catalin Corp.	
	Fiberlon	Fiberloid Corp.	
	Joanite	Joanite Corp.	
	Marblette	Marblette Corp.	
	Phenolin	Du Pont Viscoloid Co., Inc.	
8—Laminated Plastics sheets, rods and tubes (translucent in thin sheet of light color but usually opaque and in dark colors or black or wood-grain effects)	Dilecto, Celoron, etc.	Continental-Diamond Fibre Co.	Panels for architectural and other applications, doors; table, counter, and sink tops; bars, gaskets, gears, bearings, industrial truck wheels, electrical parts, cases, textile mill parts, chemical plant parts; furniture parts, automotive parts, handles, trays
	Formica	Formica Insulation Co.	
	Insurok	Richardson Co.	
	Micarta	Westinghouse Elec. & Mfg. Co.	
	Panelyte	Panelyte Corp.	
	Phenol Fibre	Taylor & Co.	
	Phenolite	National Vulcanized Fibre Co.	
	Spauldite	Spaulding Fibre Co., Inc.	
	Synthane	Synthane Corp.	
	Textolite	General Electric Co.	
9—Cold-Molded Plastics molding compounds with asphaltic, Gilsonite, pitch, phenolic or cement binder with asbestos filler (opaque, mostly black, brown or gray)	Cetec	General Electric Co.	Electrical parts and refractory parts, storage battery cases, etc.
	Ebrok	Richardson Co.	
	Gummon, Tegic, etc.	Garfield Mfg. Co.	
	Pyroplax, Thermoplax	Cutler-Hammer, Inc.	
10—Rubber-like Plastics (chiefly dark and opaque, but some forms are light and can be transparent, translucent, opaque, or mottled)	Du Prene	E. I. duPont de Nemours & Co.	Plioform, various molded parts; Pliofilm, wrapping tissue. Others used chiefly as rubber substitutes where rubber would be attacked by oils or other liquids
	Plioform, Pliofilm	Goodyear Tire & Rubber Co.	
	Koroseal	B. F. Goodrich Co.	
	Thiokol	Thiokol Corp.	

1—Basic material is nitro-cellulose (produced by action of nitric and sulphuric acid on cotton linters) plus camphor and alcohol. Softens under heat. Burns explosively.

2—Cellulose acetate produced by action of acetic acid on cotton linters or refined pulp. Is slow-burning and for this reason is often substituted for pyroxylin plastics which it resembles in appearance and in several properties.

3—Protein plastics (chiefly casein, a dairy by-product) are hardened permanently by formaldehyde. Are non-inflammable. Ford uses soy bean as source of protein.

4—Vinyl resins are made from ethylene or acetylene are non-inflammable and soften under heat, at rather low temperatures. Present uses chiefly as substitute for pyroxylin or cellulose acetate.

5—Urea resins are made from urea and formaldehyde. Become permanently hard when molded. Are non-inflammable.

6—Phenolic types of synthetic resins are most important industrially and are low in cost. They are made from phenol and formaldehyde (or furfural). Harden permanently during molding. Are amber in color and tend to darken in use, hence are usually confined to black and dark colors which are opaque when mixed with fillers (wood flour, asbestos, mica, or fabric) and pigments which are almost always added. Are very strong in proportion to weight. They are non-inflammable and resistant to temperatures up to 400 deg. F. or higher, and are good electrical insulators and poor conductors of heat Fabrication involves molding under heat and pressure except with Haveg which is applied with a trowel and then baked.

7—Cast phenolic resins are similar in ingredients to the molding type (6) but usually are made with larger proportions of formaldehyde and smaller of phenol. Do not contain fillers. They are cast in liquid form in molds, without pressure, and are subsequently cured and hardened by baking. They are produced chiefly in sheets, rods, and tubes which are machined, carved, and otherwise worked by cutting or sawing operations.

8—Laminated plastics are produced by impregnating paper or fabric with dissolved phenolic, urea, or cresol resins, evaporating the solvent and then subjecting the required thickness to heat and pressure. This curing permanently hardens the resin content. The paper or fabric add to strength and toughness. The outer layers of paper can be lithographed to produce wood-grain and other effects.

9—Cold-molded plastics are molded without heat, as a rule. Molding is rapid, as no curing in the mold is required Moldings are subsequently cured by baking in ovens. In general, strength is not equal to other types, but is adequate if sufficient thickness is allowed. Finish is usually inferior to other plastics and the weight greater. Applications are chiefly for inexpensive electrical parts or where heat resistance (or arc resistance) must be high.

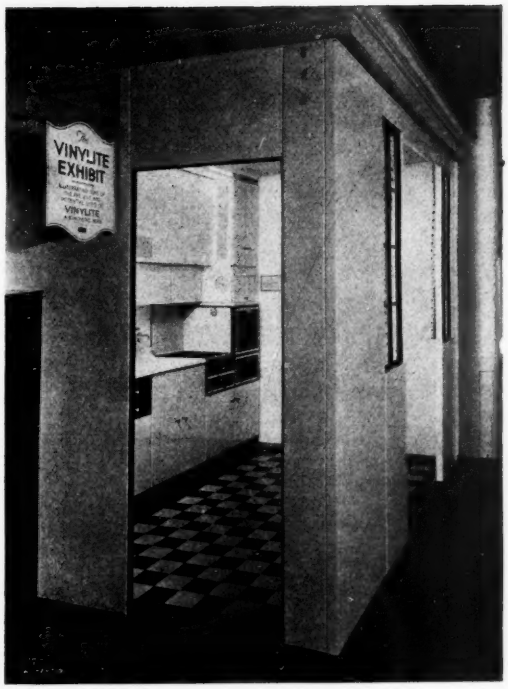
10—Except for Plioform, which looks and molds much like the cellulose plastics, the products in this group are usually applied as rubber substitutes. Some are classed as synthetic rubber.

they form timing gears, distributor tops, etc.

Ford early adopted plastics. From the use of synthetic materials, he adventured into vegetable compounds as an extension of his philosophy for helping farm income by creating new markets for crops. His pet development is with soy bean derivatives. General Motors uses plastics extensively, as do Chrysler and nearly all other automobile makers.

$50 Millions a Year

Plastics fascinate the statistician because there is so little available information about them. Taking off from actual government figures on acetate cellulose and nitrocellulose, one can drive a pencil on exciting flights. Respective production of original material in these two fields for the first nine months of 1935 was 7 million and 9 million lb., worth about $11 millions. But this excludes other synthetics (even the cheaper phenolics which make up the greatest bulk of all). Including the whole list, cost of plastic materials is estimated at $50 millions for the year.



Union Carbide Co.

Synthetic Interior

Part of a demonstration apartment of Vinylite resin. In the colorful living room, kitchen, and bath of this apartment the plastic is used in doors, wall panels, ceiling, floor tile, moldings, window panes, and many small objects of decoration and use. Exceptions are plumbing, bathtub, gas stove, furniture.

However, this $50 millions represents original material cost to the multitude of fabricators. Considering that this excludes many succeeding items (labor, plant financing, transportation, merchandising, profit all down the line) it would appear that the original material might be a fourth of the final retail value. This would mean total cost to the consumer of $200 millions.

Other government figures are available as a partial measure of the swift growth of plastics. Production of synthetic resins of coal tar origin in the United States was 1,500,000 lb. in 1921, had multiplied nearly twenty times (to 29,343,000 lb.) in ten years to 1931. There was a slight retreat in 1932, a recovery in 1933, and 1934 achieved a record of 43,351,000 lb.

Classifying the Plastics

A simple classification for plastics is (a) molded, (b) cast, (c) laminated. In the first instance, plastic powder (usually mixed with wood or other fillers) is formed under heat and pressure in the molds. Thereafter some varieties (called thermo-setting) become resistant to heat and acids—characteristics which fit them for housewares and an immense variety of premium goods.

Casting involves the pouring of plastic syrup into molds where it hardens (with cooling or baking) and is formed into tubes, bars, sheets. Where heat softens such shapes for reworking they are called thermo-plastic. Lamination involves saturating fabric or paper with plastic and subjecting the piled sheets to pressure under heat. From cast plastics fabricators produce endless kinds of products including buttons and jewelry.

Laminating has shown amazing results. From such blocks, silent gears and shaft bearings possessing unique virtues are produced. They make possible water lubrication. Where oil would soil the product (as in paper and silk making) laminated gears and bearings are employed. In a recent test, a paper-laminated gear was meshed with a metal gear and subjected to 49 million impacts. The laminated gear showed far less wear than its metal mate.

Beyond the three primary classifications, many materials, combinations, processes are encountered. Artificial resins, because of their cheapness, have achieved the greatest tonnage. Most important are phenolic compounds. Basic materials are carbolic acid (or phenol, which is a byproduct of coke) and formaldehyde.

Among competing resins are ureas and vinyls. Urea is an organic substance discovered (probably by some enquiring alchemist) in urine. Hence its name. It is made industrially from ammonia and carbon dioxide or from calcium cyanamide. Vinyl goes back (via acid-treated acetylene) to lime and coal. There are other resins, synthetic and natural, whose importance is yet to be determined and whose uses often invade paint, varnish, and lacquer fields.

Cellulose acetate is made by treating cotton linters with acetic acid and acetic anhydride. It is relatively slow-burning, unlike its cousin nitrocellulose or pyroxylin. Nitrocellulose comes from treating cotton linters with nitric and sulphuric acids.

Synthetic Rubber Coming Up

Rubber (one of the originals and still the most important plastic) is high-hatted somewhat by the synthetic materials because it is a simple vegetable product. But large corporations have recently introduced synthetic rubbers which open up entirely new possibilities.

Another family, protein plastics, is used in making buttons, belt buckles, beads. Best known of the group are casein from milk, blood albumins from slaughtering, and the soy bean proteins which have engaged the interest of Henry Ford. The casein demand has been losing ground lately before the advance of the artificial resins. Price is one reason. Better water-resistance of the resins is another.

All these basic materials compete vigorously with each other on a basis of cost and individual virtues. Molding phenolics are going strong, partly because their prices are lowest. They cost the smaller fabricators 12¢ to 30¢ per lb., against 35¢ to 38¢ for ureas, and 60¢ upward for cellulose acetate molding materials. Cast phenolics range from 60¢ per lb. up; against $1 to $3 per lb. for nitrocellulose and cellulose acetate in sheets, tubes, rods.

Physical Features of Plastics

A weakness of molding phenolics is that they are confined largely to dark colors, while ureas and other materials will take any shade. Cast phenolics are available in practically all colors, also in transparent, translucent, and opaque forms. Translucency and transparency are

also offered in cellulose plastics, ureas, vinyls, and others. Lighter colors for molding phenolics are being developed. Cellulose plastic producers are working to cut costs, widen markets.

Growing importance of the new industry caused the formation of an Organic Plastics Section of the National Bureau of Standards at Washington last October as a clearing house for research and a rallying point for information.

NEW JOBS FOR PLASTICS

Nature put herself in line for some pretty severe criticism from billiard players toward the close of the Civil War. Elephant supply was falling short of demand and a dearth of true billiard balls threatened. Extravagance of ivory hunters in saving the tusk and throwing away the elephant had something to do with it. John Wesley Hyatt, American inventor, tried to rescue all concerned by producing a composition billiard ball.

Continuing his experiments, Hyatt in 1859 discovered "celluloid." From these beginnings grew the Celluloid Corp. (founded 1872) and the cellulose activities of the far-flung du Ponts. Phenolic resins (whose cheapness and bulk give them the greatest tonnage of all plastics) started in the United States with the experiments of Holland-born Dr. Leo Hendrik Baekeland. In 1910 he formed the Bakelite Corp.

Meanwhile Fritz Pollak was working on phenolics in Austria. He got patents there about the time Dr. Baekeland took out his American patents. There were clashes —a familiar sequence when parallel lines of research finally come together. American rights to the Pollak patents were bought by the American Catalin Corp. which makes cast phenolic resins and sublicenses others. Pollak also pioneered in ureas, rights to which American Cyanamid brought to this country. Patent feuds here as in other fields have enlivened the swift development of the industry.

Basic patents on Bakelite expired in 1926. There was a grand rush of competitors into the field. General Plastics (makers of Durez) is one that has grown mightily. It has done a huge business with Ford Motor, General Motors, Western Electric, others. Intelligent management has preserved Bakelite Corp.'s importance. It has taken out supplementary patents (the total is now around 400), it has specialized, it has steadily branched out.

Such expansion has become a general trend. Disregarding the hordes of fabricators, there is a definite move on the part of big plastics suppliers to merge, buy plants, employ competing types of materials. Du Pont has expanded largely from its original position in cellulose compounds. Du Pont, Celluloid Corp., Fiberloid, Nixon are said to be branching into cast phenolic resins where Catalin (through successful patent suits) is the dominant factor. The Catalin formula has a great advantage in using 2.35 parts of formaldehyde to 1 of phenol, whereas competing compounds use them 50-50; formaldehyde costs about a third as much as phenol. From the making of films, rayon, etc., Eastman has followed through logically with cellulose plastics.

Inherent strength of plastics is indicated by the fact none of the basic materials has been defeated despite intense competition. Cellulose compounds, phenolics, ureas, vinyls, synthetic rubber (the newest development), etc., have special virtues for special uses which preserve their markets. But none is impregnable. Chemical magic which produced existing materials may still supplant them with new forms that are cheaper and better.

Ford's Soy Bean Plastics

For instance: Henry Ford has widely publicized his interest in soy bean plastics. He would help farmers buy Fords (and other things) by developing a new cash crop. Ford is putting up a $5-million plant for plastics. There is no telling where he will go if he really sets his mind to a new line of research.

The steel industry has a watchful eye on developments in this and other Detroit plants. Motor manufacturers are said to be experimenting on plastics for body panels which would have an advantage over lacquered metal in that color would go all the way through.

In addition to requiring a panel of sufficient strength, there is the other market determinant of price. Some years back Bakelite became annoyed at the growing strength of its opposition and cut the base price of phenolic molding material to 12¢ per lb. No major rival was forced out by this move—a compliment to the increasingly diverse markets. This 12¢ remains the standard. But experimenters with vegetable compounds are hoping for ultimate prices of 6¢ a lb. and lower. A triumph of farm products in this field would hit the mining industry since coal byproducts are basic in many synthetic plastics.

The price cut by Bakelite was a hard blow to the cold-molded plastics, which find their big outlet in industry. These use an asbestos filler with an asphalt, cement, or phenolic binder. They are mixed into a dough, shaped cold with one stroke under heavy pressure in single cavity molds, then baked. Standing alone in heat resistance, such forms are used in connection with heating elements in electric stoves, switch bases, wiring devices, etc. Production is fast and cheap. G-E research and support was important in further developing this type of plastics and preserving it for the electrical industry.

Westinghouse Has Big Rôle

Westinghouse has marched along with plastics progress. It makes great quantities of phenolics for its own use in molding, laminating, etc. Plastics by Westinghouse aren't confined to electrical products. It buys huge quantities of American Cyanamid's Beetle, the material being used by a subsidiary to manufacture a variety of items for the Woolworth stores.

Housing (for both machines and men) is expected to provide a huge future market for plastics. Due warning is given the minerals and the woods. Machine housing for small and simple units is old, but Toledo Synthetic (set up by Toledo Scale) opened up all sorts of possibilities with a complicated molded urea case for its new-model scale.[2] Light weight, color that goes all the way through, heat and cold resistance, easy forming and working are often clinching arguments where strength and price are satisfactory. Plastic refrigerator cabinets may be next.

Plastics and Modernism

Modernistic trends have greatly boosted the use of plastics in building, furniture and decoration, and contrariwise, plastics by their beauty have boosted modernism. Phenolics, ureas, other plastics are widely used alone and in combination with metal or wood. Panels of brilliant and lasting colors are used inside and outside bars, hotels, theaters, restaurants; in lobbies, corridors, living quarters. Striking current example is the use of plastics on the new British super-liner *Queen Mary*. The material is furnished by Formica Insulation Co., Cincinnati. How British industries allowed this order to escape

(*Continued on page* 88)

[2] *Business Week*, Aug. 10, 1935.

Research Association of British Rubber Manufacturers[1]

Membership—Purposes—Maintenance—Activities

Webster Norris

THE establishment in 1920 by the Research Association of British Rubber Manufacturers of a laboratory for scientific work in rubber has been justified long since by the valuable contributions it has made to the industry, particularly among small manufacturers unable to afford to undertake research work. The importance of this lies in the fact that it is contrary to the interest of the industry for any part of it to remain in a state of inefficiency.

Concerning the Association, its officers, and membership the following information is of special interest. The Association was first established at University College, London, and was transferred to its own premises at Croydon on the southern boundary of London in 1921. It has a membership of some 150 firms representing all sections of the industry. The officers are president, Alexander Spencer, of George Spencer, Moulton & Co., Ltd.; chairman, Major J. H. Mandleberg, of J. Mandleberg & Co., Ltd.; director, B. D. Porritt, formerly chief chemist of the North British Rubber Co., Ltd. The Association employs a staff of some thirty persons.

Purpose and Function

The Association has two principal objectives stated as follows: first, to promote research and scientific work of all kinds in connection with the rubber manufacturing trade or industry and with allied and accessory industries, and for that purpose to maintain laboratories, workshops, and such other aids as are necessary and useful; second, to issue and circulate books, periodicals, circulars, and any other literary material bearing on the industries in question and to form and maintain museums, libraries and collections of literature, statistics, scientific data, and all other forms of information together with the establishment of the loan services and information bureau work necessary to disseminate information to members.

An important aspect of the Association's functions is its position in linking together with numerous other bodies. Thus, in connection with its work on the improvement of methods of analysis and testing it gives important assistance to the British Standards Institution in formulating specifications. Through the Department of Scientific and Industrial Research of the United Kingdom Government it has close links with all the research associations representing other industries and has their information services and advice fully at its disposal. There is a close liaison with other rubber research institutions, particularly with those in Malaya, Ceylon, and London, associated with rubber production problems. The Association's library as a member of the "outlier library" scheme of the National Central Library is in a position to obtain literature from practically every important general or special library in the United Kingdom.

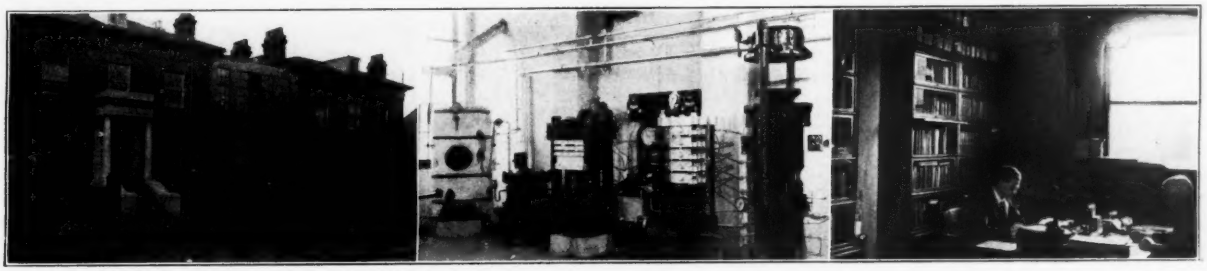
The Association is given all the powers needed to carry out the foregoing objects in the way of rights to employ skilled personnel, to accept subscriptions and other grants of money, to take part in trusts and exercise other financial formalities, and to acquire properties appropriate to its work.

Eligibility of Members

There are various classes of members in the Association differing in nationality and relation to the rubber industry. Thus memberships are described as ordinary, Dominion, associate, subscribing, and honorary. Each classification is defined as follows:

Ordinary members consist of British subjects and British corporations incorporated in Great Britain who are bona fide rubber manufacturers.

[1] Data by courtesy of B. D. Porritt, Director of Research of the Research Association of British Rubber Manufacturers.



Buildings of the Research Association

Experimental Vulcanizing Equipment with Control Board

Corner in the Information Bureau and Library

Dominion members consist of British subjects or corporate bodies incorporated in some part of the British Dominions who are bona fide rubber manufacturers.

Associate members consist of bona fide rubber manufacturers actually manufacturing in Great Britain who are not eligible as ordinary or Dominion members.

Subscribing members consist of persons and companies in any part of the world having connections with the rubber industry.

Honorary members consist of any persons nominated by the board of management for special services or for special causes.

Maintenance

The Association is supported from three main sources of income: namely, (1) subscriptions and grants of members and friends of the Association; (2) contributions, depending in amount on the amount of subscriptions under (1) from the United Kingdom Department of Scientific and Industrial Research; (3) payments received for specific consultative scientific work and for particular publications.

Scientific Work

The activities of the Association comprise scientific work conducted by the laboratory staff and intelligence services contributed by the Library and Information Bureau. The information concerning these activities gleaned from official sources[2] indicates the scope and practical value of these activities in promoting among rubber goods manufacturers fuller knowledge of the problems and possibilities of the materials with which they deal.

The scientific work undertaken in the laboratories of the Association follows:

1. Investigation of Raw Materials and Their Influence on the Finished Product. The properties of vulcanized rubber depend so largely on the materials other than raw rubber used in its manufacture that the Association undertook at the outset the systematic investigation of the exact effects of common compounding ingredients on the properties of the vulcanized product.

2. New Raw Materials. The examination of new raw materials is an important phase of cooperative scientific work. Considerable attention has been paid to this, and among the materials examined and reported on are sprayed latex rubber, Revertex, oil resisting plastics of the olefin polysulphide type, strontium sulphate, various new forms of sulphur, zinc oxide, silica, carbon black, litharge, slate flour, the white titanium and antimony oxide pigments, as well as numerous organic accelerators and antioxidants.

3. Eliminating Undesirable Properties. Two of the most serious shortcomings of rubber are aging, which ultimately destroys its utility, and swelling in oils, which makes it difficult or impossible to use rubber in contact with naphtha, benzene, mineral oils, etc.

The aging problem has been examined from two main aspects: namely, the fundamental, seeking to elucidate the nature and causes of the process of deterioration; and the directly practical, seeking to devise or try out methods of avoiding deterioration and to devise reliable means of testing rubber goods for durability. As a result of this work on aging, the preservative value of antioxidants under a variety of actual service conditions has been demonstrated. The importance of this must be stressed because so much of the value of antioxidants has been based only on accelerated aging tests. Another useful outcome has been the development of an improved method of preserving vulcanized rubber by the simultaneous use of an antioxidant and a light absorbent dye, a combination showing exceptional efficiency.

The work on swelling has revealed for the first time the important part played by oxygen and by certain impurities in the liquid. It has also indicated how oil resisting rubbers should be tested.

4. Water Absorption. The absorption of water by rubber is closely allied to swelling in oils. Its importance and a knowledge of how to control it become obvious when it is considered how many rubber goods come in contact with water and how the electrical properties of cable insulation rubber may be completely spoiled by absorption of water.

5. Test Methods and Instruments. The Research Association has done a great deal of useful work in this direction along two lines: critical examination of existing instruments and methods, and the development of new test methods and instruments.

6. Tests on Manufactured Articles. The results of this work form the basis of specifications and trade standards which likewise tend to raise the level of quality and protect the consumer from inferior products. In this connection the investigations may be cited on pneumatic tire covers, inner tubes, molded hot water bottles, and rubber soling materials.

7. Cooperation with Other Organizations. All the work so far mentioned has been carried out by the Rubber Research Association working alone as part of its own program of research or occasionally at the suggestion of some outside organization. One of the valuable features of a central organization, however, is that it can readily cooperate with other organizations on investigations of common interest. In this way much work can be successfully accomplished that would be beyond the scope of individual organizations. Three investigations of this kind that have been carried out jointly are: on ebonite with the Electrical Research Association; on cable rubbers with the Admiralty; and on development of new uses in collaboration with the Rubber Growers' Association. With reference to cooperation it is appropriate to mention the assistance given by the Rubber Research Association to the British Standards Institution as a means of indirectly promoting industrial efficiency.

8. Problems of the Individual Manufacturer. Such problems in great number and variety call for the specialized knowledge and equipment of a central laboratory. They include, as examples, elucidating the causes of defects in the finished product, developing new or improved products, carrying out special tests, testing the suitability of new raw materials, etc. During the three years 1930 to 1932 nearly 800 such problems were dealt with in the laboratories.

9. Publications. During the Association's thirteen years of active life, up to 1933, 151 reports and circulars detailing the results of every piece of research work were communicated to members. These represent about 2,000 pages of published matter. In the same period it contributed nearly fifty articles to technical and scientific journals.

10. Technical Conferences. A system of sectional technical conferences brings the members closely in touch with the work of the Association. These conferences are meetings of technical representatives of all the firms engaged in a particular branch of industry. Papers dealing with the work done or in progress in relation to that particular branch are read by the laboratory staff and are followed by a discussion which gives the members an opportunity of enquiring more closely or making sug-

[2] *The Research Association of British Rubber Manufacturers Information Bureau Journal:* "Activities of the Research Association. I. Scientific Work," J. R. Scott, Feb., 1933. II. "Intelligence Services," T. R. Dawson, Mar., 1933.

gestions concerning the work in progress. There is also a system of permanent sectional committees, each of which forms a link between its respective branch of the industry and the appropriate section of the laboratory.

Intelligence Services

The work of the Association's Library and Information Bureau has three sets of activities: collection of information; classification and indexing; and redistribution of information to users. No kind of rubber information is neglected, whether historical, scientific or technological; work on rubber planting and preparation, manufacture of all types of rubber and part rubber goods; their use and service; their commerce, foreign trade, statistics, tariffs, and legal aspects. Experience has shown that all these fields of information have value for some one, and sooner or later an inquiry comes demanding the use of the most unlikely documents and data. The material collected is in eighteen different languages. Current periodicals are received in ten of these languages. After twelve years of collecting the Association's library in 1933 contained altogether, including smaller items, more than 20,000 publications and manuscripts. This highly specialized collection is easily the most important rubber library in Europe and has only one or two peers in America.

Classification—Indexing

The enormous work of classifying and indexing this collection of 20,000 publications has been undertaken since the inception of the Research Association with the result that there is now in Croydon one of the largest detailed classified subject indexes of rubber information in the world ramifying into every phase of the industry. Parallel with the subject index all names in the literature are collected, and the 40,000 cards in the Association's alphabetical name index form a valuable auxiliary guide to a labyrinth of information.

Distribution of Information

Several distribution services have been developed to bring information to the members. In the first place the collection is a loan collection, and any member is entitled to borrow documents from the library as required. In every case where particular titles are asked for, if the items are not already in the library, they are added or temporarily borrowed from some other library. The Association's library is a member of the National Central Library outlier scheme, an arrangement by which in exchange for loans from its collection the Association can borrow from practically all the important special and general libraries in the British Isles.

The Information Bureau undertakes within the limits of its capacity to supply translations of particular foreign articles either in complete form or in précis form as desired.

The third service undertaken is the answering of inquiries for which the subject index is indispensable.

A minor service is loans of lantern slides and negatives to lecturers on rubber. There are two further activities general to members there as the publication of a journal and "Summary of Current Literature" and a series of information circulars.

Rubber Routes to U. S. Changing

According to report by Consul Thomas McEnelly, Singapore, the Mitsui Bussan Kaisha, Ltd., large financer of and trader in rubber, has six vessels calling at Singapore and also has controlling interest in the Kokusai Kisen Kaisha which has seven vessels calling at the port, all of which go to the United States via the Panama Canal. Each of these vessels is at present leaving Singapore with from 3,000 to 4,000 tons of rubber, and an average of 500 tons of tin, at the rate of at least a vessel a week. In the past three months, 50% of the rubber leaving Singapore for the United States has been carried by Japanese vessels. The time between Singapore and the Panama Canal via Japan is forty days or more, which means that at least five vessels with nearly 20,000 tons of rubber would be en route in Japanese steamers at any time.

It is possible that the tremendous reduction of rubber shipments through Suez to the United States, as reported by Consul Hugh S. Fullerton, Paris, may be due to diversion via the Panama Canal rather than to shipments around Africa. It will be observed that the flow of rubber through Suez has been greatly restricted in recent months, perhaps not entirely as a result of the situation in the Mediterranean.

RUBBER SHIPMENTS THROUGH SUEZ—LONG TONS

	To Europe	To U. S.
1935 average per mo. for first ten mos.	30,580	29,370
1935 November	31,100	2,400
1935 December	22,700	1,400
1936 January	25,200	2,400

Gaskets

(*Continued from page* 36)

tured gaskets. This question can be answered better if the joint compounds are classified in accordance with their intended function:

1. To facilitate separation of gasket from flange at a later date. No fault can be found with the application of graphite or mica, made into a paste with some fluid medium, to the face of a gasket to keep it from growing fast to the flanges, assuming such adhesion is not regarded as desirable. Graphite pastes made from an oily medium should, however, be applied sparingly to rubber gaskets, especially if these are going into high-temperature service.

2. To stick the gasket to the flange while installing, especially if the flange is vertical or upside down. It is perhaps unavoidable that shellac, etc., should be used for such purposes, even though the value of the adheisve layer in the bolted-up joint is somewhat doubtful. Suitable rubber cements might possibly be employed to better advantage.

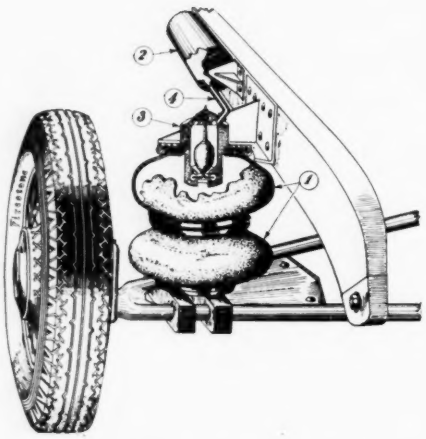
3. To help make the gasket tight. This is the function which appears of most dubious value. A gasket of properly compressible material in a joint of correct design should not require the services of any extraneous surfacing to produce a fluid-tight contact with the flange. Joint compounds for this purpose may be classified roughly into (*a*) soft-setting and (*b*) hard-setting. The soft-setting type includes compounds based on linseed oil, castor oil, soaps, asphalt, rosin, shellac (at high temperatures), etc. In contact with a rubber gasket most of these are absorbed; in contact with a nonrubber gasket they may remain to form a viscous separating layer which may have value in stopping leaks under some conditions. The hard-setting type includes compounds of Portland cement, magnesium oxychloride, plaster of Paris, litharge-glycerol, sodium silicate, shellac (at low temperatures), and sugar (at high temperatures). Most of the hard-setting types are designed to increase in volume when they set, thereby bringing more pressure to bear on the gasket. Also they may have a legitimate function in building up the surface of badly pitted flanges. Their principal weakness is a tendency to crumble under joint movement, thereby producing a granular layer which is not only without value as a packing but is a detriment in that it prevents intimate contact between the flange and the gasket proper.

Although joint compounds may be justified in a limited number of applications, the best policy is to design joints in such a way and select such gasketing materials that the need for the compounds is obviated.

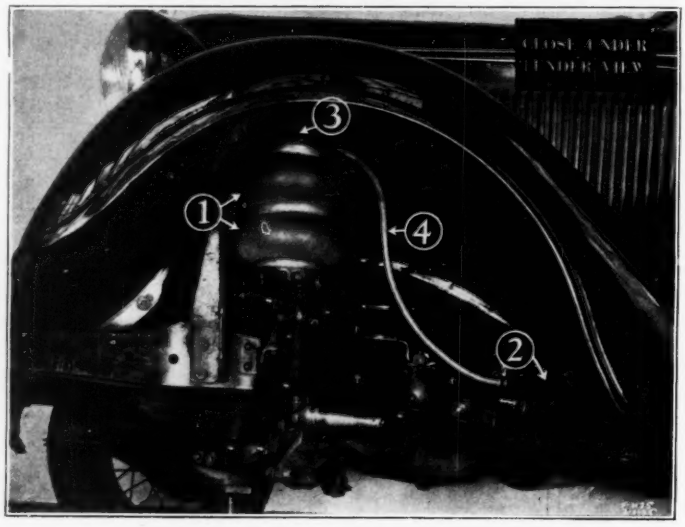
Firestone Air Spring

THE Firestone air spring, recently introduced by its inventor, R. W. Brown, research engineer of the Firestone Tire & Rubber Co., Akron, O., at a meeting of the Society of Automotive Engineers, is considered by leading automotive experts the greatest development in automobile suspension since the invention of the pneumatic tire. Its construction, application, and action are summarized as follows by its inventor.

The Firestone air spring consists of an especially developed rubberized fabric bellows (1), which is inflated with air to carry any desired load. The bellows operates automatically in conjunction with an air reservoir (2) by means of a pendulum shock absorption valve (3). The air reservoir and the bellows are connected by metal tubing (4).



Firestone Air Spring Suspension Diagram



Firestone Air Spring Suspension in Service

In explaining the engineering principles involved in the new invention, it is said that the pendulum-shock absorption valve swings outwardly when the car is rounding a turn, permitting a valve disk to close the passage to the air reservoir. This effectively increases the pressure in the bellows as the additional load, caused by turning, is applied. This also prevents the car body from inclining to the outside when driven on curves at high speeds. Similar action prevents "nosing down" when heavy brake applications are made. When the pendulum is vertical, the passage of air from the bellows to the reservoir is unrestricted because the tip of the pendulum engages an extension on the valve disk, thus holding it open. After the wheels pass over a road obstruction the bellows extend, reducing the pressure; the air flow from the reservoir to the bellows is restricted, thus providing desired shock absorption.

Foremost among the improvements thus brought about are easier riding, with less fatigue to the car's passenger; elimination of body roll when rounding corners at high speed; remarkable shock absorption control, obliterating the effect of road irregularities on the passenger; provision of facilities for controlling the softness of riding quality; and quieter operation.

Laboratory tests over a period of months and actual tests of the air springs on test cars show that the new suspension principle is sound and practical and provides solution of the problems of the old type of spring systems. Air springs are as different from metal springs and their necessary accessory equipment as balloon tires are from the old-fashioned solid rubber carriage tires. These springs provide added safety to modern high-speed driving.

The fact that the suspension unit is mounted more nearly at the level of the center of gravity reduces the tendency of the body to roll when rounding curves. The center of gravity on an automobile is near the center of the radiator. Being attached near this central point, the air spring provides greater cornering stability. The method of mounting places the major portion of the load directly on the car's knuckle forging, thus relieving the load on the linkage bearings and hence reducing wear and lubrication difficulties.

For the first time the full advantages of riding on air are realized in a simple, rugged, and practical manner. The ability to adjust the suspension to the load without mechanical limitation and to provide any degree of softness desired to the ride, without interfering with steering, load capacity, or ruggedness, commands the serious consideration of those concerned in providing better riding qualities in motor cars.

THE ABSENCE OF PAST STATISTICS OF NATIVE RUBBER production in Netherland India necessitated restriction of exports by the application of a sliding scale export tax that becomes so high beyond permissible quantities as to yield the producer no return for his effort. This condition has caused the former differential between native brown crepe and standard grades—price index 100—to narrow approximately as follows: January, 1934, 64; 1935, 79; 1936, 95.

Raw Rubber and Latex in America[1]

Edgar Rhodes, Ph.D., M.Sc., A.I.R.I. (Sc.) [2]

MOST of you are probably aware that in April of this year I was able to visit the United States of America. I went there because I was invited to attend the Spring Meeting of the Rubber Division of the American Chemical Society and to address that body on matters concerning the manufacture of crude rubber in Malaya. I need hardly say that I met there a very large number of people whose chief interest in life centers around the utilization of rubber and latex. I saw there many interesting things and I am here today to tell you about some of the things I saw and the impressions that I gathered.

Raw Rubber

I was particularly anxious to find out what American consumers were thinking about the quality of present-day plantation rubber, and I may say that it did not take long for me to discover that, in so far as concerned standard grades of smoked sheet and crepe, American consumers could see little or no improvement in quality over that of the rubber of ten years or more ago. No big user was prepared to say that he could recognize any startling improvement. I was told that plantation rubber was more variable in rate of vulcanization than the user would like it to be; that the variation which occurred in the plasticity of estate rubber was a considerable trouble. By plasticity one means softness, as indicated by the ease with which it can be masticated on the mixing rolls. One batch of estate rubber will be hard and difficult to masticate; while another will be softer and more easily handled. The aging properties of our rubber or, in other words, the tendency to perish after vulcanization, also vary, and users are still looking for greater constancy in this property as in the other properties. Nearly everyone complained that supplies of really clean rubber were hard to come by. Now is there any truth in all this? Yes, there is. If I had not known it already, a number of things that I saw in American factories would have convinced me or anyone else. In the matter of variability in rate of vulcanization I saw rubber from four or five different sources being bulked for one batch, with the idea of smoothing out that variability. I saw rubber from four or five sources being passed through big crepe rolls and then combined into a single wet blanket-like crepe. This was intended to wash out dirt as well as to smooth out variation. I saw inside one factory a highly specialized organization of men which made rapid checks on the rate of vulcanization of the rubber not only when masticated raw, but when the compounding ingredients were added. They were doing this on every batch.

Now all that costs money all the time, and it is impossible to believe that in America or anywhere else in industry in these days, things like that would be done if they were not necessary. In the matter of variation in plasticity I saw regular routine tests being performed to determine the degree of softness of each batch. I saw there large machines specially designed for giving a mechanical pre-treatment which brought plasticity to more workable limits. These machines look like a sawn-off fifteen-inch naval gun, and the rubber is softened by forcing it through the hot barrel in the form of a tube. In one case where these machines or plasticators are not used I had a wonderful object lesson in the damage which can be done by an unusually tough rubber; I saw a mill roll eighty inches long and over twelve inches thick broken clean in two under the strain caused by some exceptionally hard rubber.

TENDENCY TO PERISH. In the matter of poor aging properties there are people in all the factories measuring the tendency to perish and incorporating expensive chemicals to overcome any defects which they find. In the matter of clean rubber, I saw special machines which literally strained out dirt by brute force from the softened, masticated mix by driving it through specially constructed sieves. I have seen as much as a handful of sand and bark removed from a ton of rubber. If that rubber were used for motor tubes without this straining, those tubes would be faulty; the grit would work through and cause slow punctures. If it were used for printers' rolls, the grit would work out and the printing would be made dirty and specky by the ink in the tiny pockets left by the dirt. Yes, the dirt is there, and lots of money is spent in taking it out.

Now can we do anything about these things and is it worth our while to try? I think the answer is that we can do and are doing a little to improve matters, and that although it is true that our rubber appears to be bought cheerfully enough in America, and although people there have equipped themselves to correct faults in our product, and we manage to get along without hearing too much about it, yet it is still worth while for us to do what we can to produce a more uniform and clean article.

Now what can we do in this direction and what can we not do?

UNIFORMITY OF PROPERTIES. First of all, what about uniformity in rate of cure, uniformity in aging properties and in plasticity. I found more than one user of rubber who seemed to incline to the view that the plantation factory was solely responsible for the variability; that it was perhaps, to put it crudely, rather slipshod in method and lacking in finesse, and that if latex and rubber handling were better organized, variation could be eliminated.

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[1] Reprinted from *Bull. Rubber Growers' Assocn.*, Nov., 1935, pp. 492-502. This paper was read at the annual conference of the Incorporated Society of Planters held in Malacca in September and is reprinted from the *Planter* of October. The paper forms a useful supplement to the papers delivered by G. A. Sackett and Dr. Rhodes before the Rubber Division of the American Chemical Society, which were published in INDIA RUBBER WORLD, Dec. 1, 1935, pp. 31-34; Jan. 1, 1936, pp. 41-44; Feb. 1, 1936, pp. 33-34.

[2] Senior Officer, Chemical Division, The Rubber Research Institute of Malaya.

Others who were more *au fait* with plantation matters realized that the elimination of variability by a simple tightening up of factory routine was by no means the whole story. In a talk which I gave to the Rubber Division I explained that variation in the product was to a great extent due to inherent variation in the raw material, that is latex, from which that product is made. If one were able to say that latex is a stable material of constant composition and properties, like a sample of Epsom salts from a chemist's shop, then variation in the raw rubber would be almost entirely a matter of variation in factory handling. But latex is not such a material; it is not a pure synthetic chemical, but a biological fluid of which the composition is anything but constant. There lies the fundamental difficulty.

The raw material is itself variable, and from that variable material we are required to make a product of which the composition and properties will be uniform. Many people did not realize that the composition of our latex varies under the influence of at least six factors: namely, (1) Season of the year; (2) Age of the trees; (3) Geographical situation; (4) State of soil; (5) Genetic strain of trees; (6) Method of tapping.

Of these six factors the first five cause variations which we cannot by any means at our disposal prevent.

Variation due to these causes is inherent in the trees and their locality. Variations occur not only in the dry rubber content of the latex but also in the content of non-rubber constituents, nitrogenous and mineral matter and the like. There is no point in discussing these variations in detail, but one can readily call to mind examples of seasonal variations such as:

1. High dry rubber contents in February—March when the trees are wintering.
2. Minimum dry rubber content in April—May when the trees are refoliating rapidly.
3. Maximum dry rubber content in July—August when refoliation is complete.
4. Fall in dry rubber content in September and December when these months are wet.
5. Low ash or mineral content at wintering time.
6. Low ash again at seed-fall time in July or August.

Variability in Rate of Cure. Changes due to these factors confer variability on the rate of cure of the rubber produced from this variable latex, and they are a fundamental obstacle to the preparation of a uniform rubber. In addition to this inherent variability, there is variability due to the very method of tapping the tree. The act of tapping always imposes some strain on a tree, and the greater the strain, the greater will be the variability in composition of the resultant latex. From the point of view of uniformity in latex composition one would favor a system of tapping which is not too severe, and in the ideal, all estates would use precisely the same system.

One would look with less favor on the daily alternate monthly system of the Dutch East Indies than on the alternate daily or A.B.C. systems of Malaya. In the former system the strain is severe enough to result in a change in latex composition every day. The latex crop is different every day. In our systems the composition of the latex becomes fairly constant after a few days, apart from seasonal variations, and one would favor our long period continuous tapping system on this account.

I am afraid we shall never be able to persuade everyone to adopt the same tapping system; there are many other considerations besides uniformity which govern the choice of one's system, and the net result is that we shall always have to handle variable latex. A great deal of our variability comes into the factory with the latex and this was the point which I tried to emphasize to those who had not realized it. But is there any excuse for not endeavoring in the factory to smooth out, if we can, some of these variables and not by slipshod work introduce more in the factory itself? I think there is no excuse. Lack of finesse in the factory not only makes an inherently variable rubber more variable, but it is also in nearly every case more expensive in hard cash to the estate, than up-to-date latex handling. It nearly always wastes man power and money to use out-of-date tanks, wooden hand rollers, and old machines without coagulum chutes or troughs. In other words it is expensive to make wasp-waisted thick-ended sheet of variable average thickness which might or might not dry in a prescribed period and which is variable from day to day by the fact of inability to ensure that every sheet will be like every other sheet. It is usually cheaper to make sheet with modern equipment which permits of centralization, with bulking to even out variability due to age of trees and geographical situation, with proper handling from tank to machines to avoid deformation, and proper machining to a uniform and reasonably thin sheet which can be dried always in a specified time in better controlled drying houses. It is possible to avoid introducing new variables in the factory and to do something to smooth out inherent variability. We can do that at no extra cost. That much we should try to do, and I tried in America to explain that although an absolutely uniform rubber is probably an ideal that we shall never reach, yet something is being done by many producers as financial and other considerations permit.

Aging and Plasticity. There is no doubt, however, that there remains more to be done, and work which is now being carried out by my colleague, Mr. Hastings, indicates that variation in aging properties and perhaps also in plasticity is probably intimately linked with:

1. Variation in the manner in which sheet is dried.
2. Variation in copper or manganese content of the rubber.

The work is not completed, but he has obtained evidence that the aging properties of the rubber from the same parent latex when dried in hot air or in smoke for different periods and at different temperatures can be made very, very different while the appearance may remain perfect in all cases. Similarly, but to a lesser extent, drying affects plasticity. In respect of rubber dried in a certain way we had already obtained indications of poor properties, even before my visit to America, and it was with no surprise that I found myself being earnestly questioned about this form of rubber by a very large American tire manufacturer who had experienced very great difficulty with it. Here then in drying is a field in which research can contribute something more towards uniformity of properties. In the ideal, research would have prescribed a perfect method of drying, and all estates would be practising it. That is for the future, but I would like you to feel that, as far as concerns us, we are exploring the position as thoroughly as possible.

Brass Sieves

Not a Safe Utensil on Estates. In the matter of metallic contamination of latex it has already been shown by us in one particular instance that contamination with manganese can cause serious changes in the properties of rubber. Recent work which should be published shortly by Mr. Hastings indicates that the brass sieve which is, I am sorry to say, in almost universal use on estates, is not a safe utensil. It requires only a very small trace of copper to make great changes in the properties of rubber, and it is more than likely that, even now, variation is being caused by the use of brass sieves on estates. It has

actually been found that fresh natural latex which has suffered no metallic contamination at all contains very small but measurable amounts of copper as a natural constituent, and if this amount is augmented by copper from sieves, it may cause appreciable changes in properties. Here again the sheet may look quite satisfactory to the eye when it leaves the estate, but the properties may nevertheless not be satisfactory. It has been shown recently by other investigators that the first effect of traces of copper is to bring about an invisible disaggregation of the caoutchouc, after which oxygen is absorbed and the rubber may then resinify visibly. It is probable that rubber is leaving this country with a copper content sufficient to cause a slight disaggregation and variation in properties, without its being able to reach the final visible stage of resinification before being used by the manufacturer. For this, the remedy is obvious. It is to substitute Nickel gauze or Monel metal sieves for brass. The sooner the brass sieve has become a thing of the past the better.

Now while it is true to say that there remains more for us to do towards achieving uniformity of properties it is true also, as I have said, that we could all of us name a number of estates on which manufacture has improved greatly, is nicely controlled and likely to reduce variability to something well below the present average, and at first one wonders at the fact that American consumers still notice no real improvement in their supplies. On more careful consideration, however, one cannot but feel that this is due to the fact that they are in nearly all cases buying rubber which fits a visual standard and not necessarily rubber which besides looking right to the eyes is good in respect of its properties. In buying a consignment of rubber of a certain grade, the user buys rubber which may come from many sources, and he has no control over these sources. It will usually be a mixture of rubbers from estates where manufacture is both good and bad from the point of view of uniformity, and there is really small wonder that little or no general improvement is noticeable yet. The remedy of course would be a more direct contact between the user and selected estates. It is possible that the example already set by one French concern may be followed by users in America who wish to benefit to the full by such progress as has been made recently on many estates.

Clean Rubber. With regard to really clean rubber, we know that many estates recently equipped with large bulking and settling tanks can make sheet which is free from visible sand particles and from most if not all of the very fine grit which escapes the eye when embedded in a sheet of rubber. Such rubber really deserves a better fate than that of being sold along with other rubber which is only just free enough from visible dirt to pass the visual standard of the market. When it reaches the user as part of a mixed consignment, the sand which is found in the strained composite mix is responsible for the complaint that it is hard to obtain really clean rubber. It was said to me that the difference in the degree of cleanliness of the average estate rubber and some grades from Asiatic holdings was getting smaller, or, in other words, more and more rubber from Asiatic holdings was being prepared to a standard approaching that of European estate rubber. It was argued that if European estates wished to maintain a price premium, then the easiest and most certain way of doing it was to concentrate upon perfect freedom from all grit, even that which is so fine as to escape detection by visual inspection. The use of centrifugal clarifiers in conjunction with settling tanks on all estates was very seriously urged. As far as I am aware, no Malayan estate has yet gone to this length, and I am not satisfied that it is really necessary, but the time may come when estate groups which already make good clean rubber from settled latex and which are in more direct contact with the user, may install centrifugals as a process refinement and find them useful as a selling point.

Special Rubbers. There were some signs that, for some uses, special rubbers would be acceptable. By special rubbers one means products which might fit no existing market grade, but which had for instance the property of extremely low water absorption or which were very plastic. No existing grade of rubber ever is sufficiently non-absorbent for some uses or sufficiently plastic for others. Rubber which is intended for use in cables must have a very low water absorption; otherwise the cable rapidly becomes useless. All rubber of present-day market grades is too absorbent, and if it is to be used, it requires very special pre-treatment by the cable maker. Most makers of insulated wire are very anxious to obtain low water absorption rubber ready made on the plantation. At the Institute, research work has been proceeding actively for some time on this subject, but so far we have not found an easy method of preparation which could be adopted on estates without danger of infringing existing patents, so that at present we are not able to prescribe to estates a method of manufacture. This much we do know, however, that by simple soaking treatments the water absorption of sheet rubber or crepe can be reduced very considerably, but not to negligible proportions. By certain enzymic treatments further reduction can be achieved, but these are not held sufficiently effective.

Soft Rubber. Further we are almost sure that if rubber is to have an almost negligible water absorption it is extremely probable that in achieving this, it will no longer be possible to place the rubber on the market in a form in which it would be classified as really good rubber by present market standards. A similar state of affairs applies to very soft or plastic rubber. While in America I saw soft rubbers which had been prepared by a patented process, which involves shredding up smoked sheet or crepe, heating it in an autoclave, and then allowing the hot mass to absorb oxygen from the air. The process can be controlled so as to give rubbers of any desired degree of softness. A number of American users are interested in this softened rubber, but the price was higher than they were prepared to pay at the time of my visit. The appearance of the softened rubber was such as would have given it no place at all on the Singapore or London markets. At the Institute we have been interested for some time in producing a soft rubber by treatment of the original latex and not the finished rubber. It has been found fairly easy to produce soft rubber, but not without at the same time affecting other properties adversely. The work is proceeding, but even if a satisfactory solution is found, the product will not be "pretty rubber."

I have mentioned these special rubbers because I feel they indicate that when research has progressed further a few live estates may be able to do well by supplying special rubbers suitable for special purposes. When this day comes, either direct contact between user and producer, or new market grades will be necessary. I am sure that as soon as it becomes possible for estates to prepare special rubbers such as these and as soon as America knows it, profitable but not necessarily large outlets for them will show themselves, and it will be for a few progressive estates to take advantage of them. On the whole then I think that with raw rubber the future will hold something for the few estates that can produce that "something better" or that "something new."

(To be concluded)

Editorials

Business Activity Assured

STRICTLY from the point of view of the prospects of substantial business activity throughout the summer and early fall months the following Congressional Intelligence special economic analysis of Washington activities should prove of particular interest.

"Increased governmental spending furnishes the key to an understanding of the business situation during the period between now and election. This factor should far outweigh in its effects anything that might happen in Europe or in domestic politics.

"It is difficult to see how anything material in the way of a seasonal recession can develop in business from now until November, regardless of how sharp the spring upturn proves to be. Severe weather in February and the improved prospects of the building industry combine to make the spring rise later than usual this year. It will probably reach its culmination only in May.

"However, government spending may rise to a rate of some $750,000,000 monthly through the summer. Activity is likely to turn upward again in June in anticipation of this flood of purchasing power. The peak rate of activity for the year, therefore, may be witnessed only in August, when usually a substantial summer recession in business occurs.

"A sign of the times is the fact that more than one automobile company is considering putting out its new 1937 models early in the summer, to take advantage of the favorable conditions expected to prevail at that time."

In addition enormous sums of money from sources yet largely undetermined will be expended in the task of rehabilitating those vast areas so disastrously affected by the recent floods.

Distribution Needs Science

THE scientific development of new products and the constantly improving methods of producing them have progressed so extensively during the past twenty-five years as to necessitate slowing down the efficient machinery of industry to a snail's pace, figuratively, to be in proper synchronization with the decidedly backward scheme of distribution. Industry has achieved advancement no end that continues without apparent limit because of yielding its former trite ideas of conduct to the progressive intelligence of scientific research; while distribution, except for the important developments of advertising service and technical salescraft, continues dressing the old and oftentimes conflicting principles in new clothes without favorably affecting the exorbitant cost of placing the manufactured article in the hands of the ultimate consumer.

The dormant existence of stocks of efficiently manufactured goods and the destruction of great quantities of surplus commodities in the presence of want by millions of people during the late depression serves, among other things, as an indictment of present distribution principles. Savings in manufacturing costs frequently have not reached the ultimate consumer so as to improve volume; perhaps even more frequently fictitiously low prices are given to the consumer, at the investor's expense, when there is little or no prospect of increasing the absorption; and ridiculous guarantee standards are devised which bear no relation whatever to the service capacity of the product—these are but a few of the unhealthful principles that are basically grounded in selfish destruction rather than constructive intelligence.

Abundant and impressive are the examples proving that as prices are reduced, vast new fields of volume outlet automatically appear. The matter of reducing costs, therefore legitimate prices, should be the common objective of both the manufacturing and distributing phases of industry.

It is increasingly evident that far-sighted business leaders realize the lagging character of distribution methods, also that scientific research diligently applied will produce the same degree of progress here as it has done in manufacturing. Whatever sciences may become involved or however they may find an approach to the problem of readjusting distribution, it can be said without fear of contradiction that the idea is no less tangible now than was that of applying sciences to manufacturing in most industries as recently as twenty-five years ago.

Economic Waste

THE feeling of relieved tension that was demonstrated by thousands of Goodyear workers, in Akron, O., as the physical phase of the five-week strike ended Saturday, March 21, was shared to some extent by all persons with interests in the rubber industry. The cost to Goodyear employes is said to be 2½ to 3 millions of dollars in lost wages, the loss to workers of concerns partially depending on Goodyear activity and that of the company itself runs into inestimable millions. The value obtained is not apparent. A balance sheet prepared by those responsible would be most interesting.

D C McRoberts
EDITOR

What the Rubber Chemists Are Doing

A. C. S. Rubber Division Meetings

THE American Chemical Society will hold its ninety-first meeting at Kansas City, Mo., April 13 to 17. The headquarters and registration of the society will be at the Hotel Muehlebach, Twelfth and Baltimore Sts. But it has been suggested Rubber Division members make reservations at the Hotel President, Fourteenth and Baltimore Sts.

The Division of Rubber Chemistry will conduct its sessions April 15 and 16. During the afternoon of the fifteenth five papers (abstracts below) will be read and discussed. That evening the division's banquet will take place. The following morning will be devoted to a report of the crude rubber committee, a general discussion, and the business meeting. Officers of the Rubber Division are Norman A. Shepard, chairman; C. W. Christensen, secretary-treasurer; L. W. Brock, sergeant-at-arms.

Abstracts

Impact Machine for Testing the Tensile Properties of Rubber at High Speed. The impact machine described is equally applicable to the measurement of the tensile strength of rubber and to the measurement of the energy storage capacity at different elongations. (The machine is applicable to the testing of both vulcanized and unvulcanized rubber.) The operating speed is more than 25,000 cm. (10,000 inches) per minute as compared with 50 to 70 cm. (20 to 30 inches) per minute by the standard procedure. The corrections involved in the determination of values are of constant magnitude and can be determined with close approximation. The degree of duplicability of results, when the test is used to determine the energy storage capacity at break, compares to that obtainable by any slow-speed machine. The degree of duplicability is very good when the relation between stress and strain is sought. (At the different elongations.) The simplicity of manipulations required on this type of test leads to the possibility of its use as a method of routine control. George J. Albertoni.

Effect of Vulcanization on the X-Ray Diagram of Gutta Percha. By comparing the lattice plane spacings of pure gutta-percha hydrocarbon, of balata, and of gutta percha vulcanized for different times at 142° C., it is shown that apparently vulcanization (to the extent employed) has no effect on the crystal structures of either the alpha or beta modifications of gutta percha. The measurements on balata confirm the previous finding of others that the X-ray patterns of these two substances are identical. Vulcanization is found to have an effect, however, in increasing the degree of orientation of the crystallites produced by stretching. Through this improved orientation it is possible to obtain more accurate measurements of the identity periods in the fiber direction than heretofore. Results of measurement on the beta form of gutta percha show that the fiber period is 4.77 ± 0.03 Å or a multiple of this figure, in good agreement with previous work. The application of the graphical method of solution to this form of gutta percha shows that the unit cell chosen by Bruni and Natta does not agree with the X-ray results. The dimensions of the unit cell found to be in best agreement with the data are: $a = 15.7$ or 7.85 Å, $b = 4.77$ or 9.45 Å (fiber axis), $c = 11.9$ Å. The cell appears to be orthorhombic. A number of repeating units per cell of 4 or 8 agrees with the known density of gutta-percha crystals. No detailed treatment of the alpha form of gutta percha is possible with the data at present available. Measurements of the fiber period of this form show anomalies which may indicate the presence of still another modification, although no satisfactory explanation of the measurements has been found. A summary of all the measurements on gutta percha compared with those of other authors is given. Evidence that the transition of beta to alpha gutta percha is not always irreversible even when cooled rapidly though the transition point is found. C. S. Fuller.

Changes in Properties and Structure of Carbon Black Accompanying Loss of Rubber Reenforcement Characteristics. Carbon black subjected to suitable heat treatment loses its property of reenforcing rubber. Changes in chemical composition, physical structure, surface activity, and particle size accompanying this change in rubber characteristics are studied. The properties of the new product are compared with properties of other carbon pigments. Little, if any, change in particle size has taken place, but a distinct change in inner structure of the carbon black particle is indicated by X-ray examination. F. H. Amon.

The Pendulum as a Source of Energy for Plasticity Measurements. A pendulum of known potential energy is used to produce a definite, rapid deformation in a plastic material. The dampening effect produced on the pendulum is a measure of the energy expended to produce the deformation. The elastic recovery following the rapid deformation is much greater than that obtained with the ordinary parallel plate instrument. The actual measurement of the energy consumed and elastic recovery required less than one minute. Ira Williams.

Reenforcement of Rubber by Pigments. III. Comparative Rating of Rubber Gas Blacks by Heat of Wetting Measurements. For many years no method of rating has been considered of sufficiently general application to be termed the "standard" method for comparative rating of rubber gas black samples, either as pigments or as compounded in vulcanized stocks. Results obtained by pendulum rebound of the vulcanized stocks have apparently proved most satisfactory by plant practice and are given some precedence over those obtained by other methods. A scientific method of rating comparative rubber black samples by their relative degree of surface polarity, as derived from heat of wetting measurements, has been developed and is found to agree in almost perfect order and with reasonable magnitude with that rating produced by relative pendulum rebound values. An attempt to correlate the relative specific or active surface area of rubber black samples, by (1) the "count" method and (2) heats of wetting with anhydrous benzene, with those physical tests now used in plant practice failed to disclose comparisons of value. C. W. Walton and H. J. Osterhof.

Future Meetings

The A. C. S. lists its other forthcoming meetings as follows: ninety-second, Pittsburgh, Pa., September 7 to 11, 1936; ninety-third, Chapel Hill, N. C., April 12 to 15, 1937; ninety-fourth meeting, Rochester, N. Y., in the Fall of 1937.

Los Angeles Group

THE Los Angeles Group, Rubber Division, A. C. S., held a well-attended meeting and dinner March 3 in the dining room of the Los Angeles Furniture Mart, 2155 E. Seventh St. Ninety-two persons were present. Chairman G. G. Balazs presided, returning after several months' absence due to illness.

The program included a very interesting talk by Allen G. McGrath, of Darnell Corp., Long Beach, Calif., on the manufacture of rubber wheels and casters by that concern, the largest producers in the world of those items.

J. E. Phillips, assistant plant engineer of the United States Rubber Co., talked on "Mold Problems," featuring those of tire production.

Columbia Steel Co., a subsidiary of the U. S. Steel Corp., was represented by a moving picture on "The Story of Steel," accompanied by an illustrated lecture on the design and construction of the new bridge at San Francisco, Calif.

T. Kirk Hill, of the Kirkhill Rubber Co., Los Angeles, sponsored Red Smith, the Playful Plumber, who rendered several musical numbers on instruments adapted from such rubber articles as a water bottle, plumbers' friend, etc.

Door prizes contributed by Francis Pratt, of E. I. du Pont de Nemours & Co., Inc., were won by Ned Tarkington, of Goodyear Tire & Rubber Co., a desk set; James Gardner, of Santa Fé Rubber Mills, a lighter; and John Lockridge, of Goodyear, a pencil.

The next meeting was held March 23 at the Los Angeles Athletic Club dining room. The date was advanced from early April in order that the group might hear Dr. A. Moore, of the Rubber Research Institute of Malaya, Kuala Lumpur, on the "Causes of Variation in Crude Rubber." George C. Follett, of Naugatuck Chemical, was to talk on rubber labels.

New York Group

THE New York Group, Rubber Division, A. C. S., will hold its next meeting Friday evening, April 10, at the Building Trades Club, 2 Park Ave., New York, N. Y. Dinner will be served at 6.30 p. m. Tickets are priced at $2 each.

The program includes two speakers, Col. A. F. Townsend, chairman of the board Raybestos-Manhattan, Inc., Passaic, N. J., who will speak on "Operations of the International Rubber Regulation Committee." Colonel Townsend is the American delegate on this committee. The other speaker is D. A. Comes, Farrel-Birmingham Co., Inc., Ansonia, Conn., whose subject is "Hot vs. Cold Breakdown."

The membership is requested to make early reservations with Secretary Peter P. Pinto, *The Rubber Age*, 250 W. 57th St., New York, as large attendance is expected, and advance information will facilitate arrangements on the part of the secretary.

Chicago Group

THE Chicago Group, Rubber Division, A. C. S., held a special meeting March 13 at the Adventurers Club, Chicago, Ill. Secretary B. W. Lewis acted as chairman.

Harold F. Wakefield, of the Bakelite Corp., Bloomfield, N. J., in an informative talk on "Synthetic Resins in the Rubber Industry" outlined the developments and uses of synthetic resin and the cooperation of this industry with the rubber trade in combining synthetic resin with certain forms of rubber.

J. C. Nichols, of the Adventurers Club, gave an interesting description of "Game Hunting in Wyoming" illustrated with motion pictures.

For details of May 1 meeting see p. 61.

A.S.T.M. Committee D-11

A.S.T.M. COMMITTEE D-11 on Rubber Products at its meeting during Committee Week in Pittsburgh, Pa., March 2 to 6, completed plans for a group of technical papers, to be presented at the Society's annual meeting in Atlantic City in June, which will comprise a symposium on "The Relations between Laboratory Evaluation and Service Life of Rubber Products." The subject will be covered by five papers on different types of rubber products, including tires, footwear, automotive parts, hose and belts, insulated wire and cable.

The specifications and test methods under the jurisdiction of the committee, recently published in a special volume of "A.S.T.M. Standards on Rubber Products," were thoroughly reviewed, and some changes decided upon. In the Standard Methods of Chemical Analysis of Rubber Products (D 297-32) the short procedure is to be brought into conformity with the long test procedure, and other revisions will affect the determinations of total sulphur and carbon as well as the analysis of hard rubber. In the Tentative Methods of Tension Testing of Vulcanized Rubber (D 412-35 T) instructions for calibration of testing machines will be included; also, the number of required test specimens will be reduced in cases of inspection tests where minimum values have been established. Several revisions were approved in the Tentative Methods of Test for Accelerated Aging of Vulcanized Rubber (D 428-35 T). It was decided to amplify the present Tentative Method of Test for Compression Set of Vulcanized Rubber (D 395-34 T) which involves the use of constant load by adding an alternative method using constant distortion and also to provide for use of cylindrical instead of rectangular test specimens.

The committee has been making an extensive study of a method for testing the effect on rubber compounds of air at elevated pressure and temperature. This test, commonly known as the air bomb aging test, is assuming increasing importance for service evaluation of rubber compounds designed to resist heat and oxidation. It is particularly applicable and widely used for such products as inner tubes for truck tire service. The results of a survey of the use being made of the test at present were presented to the committee at its meeting. These reports, received from twenty-two laboratories, showed that this test was being employed in various forms by eighteen of the laboratories. Because of the obvious importance of this method, it was decided to proceed at once with the preparation of a standardized procedure covering present practice and at the same time to initiate a program for extensive investigation of the test, looking toward improvement and further standardization of the method.

Another survey was reported covering the use of the existing Standard Specifications for Rubber Gloves for Electrical Workers on Apparatus or Circuits Not Exceeding 3,000 Volts to Ground (D 120-23). As a result of this survey, some suggested changes have been taken under consideration.

Results were reported to the committee of an extensive cooperative test program on insulating tapes in which it was found that the testing methods for rubber tape apparently give results more indicative than corresponding tests for friction tape. In consequence further study will be made of the latter.

Consideration has been given by the committee during the year to ways and means of securing better standard rubber specimens, having certified and tested properties for use as a reference base in methods of testing rubber products. Results were reported to the committee of studies made in connection with the development of such reference standard rubber samples for test purposes. These data, obtained in a single laboratory, give much encouragement to the project. It was decided to continue the work, extending the program to include several laboratories.

The subcommittee on insulated wire and cable decided to reorganize to carry on its work through two main sections to improve its effectiveness. To this end the present sections on insulation resistant to acid, alkali, and oil; corona-resistant rubber; saturants and finishes; and 60% rubber sheath compound, were dissolved and replaced by new sections on (1) materials specifications and (2) test methods. Section (1) is to proceed at once to a consideration of revisions of the three existing Tentative Specifications for Insulated Wire and Cable: Class AO, 30% Hevea Rubber Compound (D 27-35 T); (Class A, 30% Hevea Rubber Compound (D 393-34 T); and Performance Rubber Compound (D 353-35 T); and of development of new specifications covering tough jacket compounds and possibly heat-resisting insulation. Section (2) will devote its attention at present to methods of test for high-

voltage compounds, moisture absorption, and thickness measurement of rubber and braid insulation. The subcommittee also decided to reconsider the present limitation to 5,000 volts of Table IV on Thickness of Insulation and Alternating Test Voltage in the Specifications D 27-35 T. Suggested changes will be presented at the next meeting.

Officers of Committee D-11 are chairman, H. A. Depew, research chemist, American Zinc Sales Co.; and secretary, Arthur W. Carpenter, manager of testing laboratories, The B. F. Goodrich Co.

Rhode Island Rubber Club

THE Rhode Island Rubber Club held its spring meeting at the Narragansett Hotel, Providence, R. I., March 12, 1936. About 140 members and guests attended the dinner and lectures that followed.

Using as his subject "Experiences in the Rubber Industry during the Past Twenty-five Years," John M. Bierer, factory manager, Boston Woven Hose & Rubber Co., Cambridge, Mass., capably presented an analysis of the rubber industry by allegorically likening the remarkable scientific progress of the manufacturing phase to the commendable personality of Dr. Jekyl; while the fiscal and commercial aspects were depicted as of the same order as Mr. Hyde's depravity. The history of the outstanding rubber product quality, appearance, and cost improvements was traced and credited to the diligence of chemists and engineers. Similarly, and with impressive practical examples, Mr. Bierer credited to rubber executives the existence of commercial policies such as price wars, unconditional time guarantees, and confidential discounts, which are ruinous to the otherwise excellent industry and discouraging to the investor who has realized one-seventh of one per cent on his money in the past twenty-five years.

Color photography was revealed at its best as masterfully applied by Alton Hall Blackington, news photographer and lecturer of Boston, to the range of illustrations from romantic beauty to tragic gruesomeness that accompanied his interesting and unusual lecture on "Romance of News Gathering."

Rubber in Engineering

The Cornell University College of Engineering, Ithaca, N. Y., has inaugurated an extensive campaign of research covering twenty-three subjects in mechanical engineering. Among these is an experimental investigation of the mechanical properties of rubber, fuller knowledge of which may result in its further development for engineering purposes in automotive and other directions.

The Use of Latex in Tanning Leather[1]

AT A recent meeting of the Belgian Section of the International Association of Chemists of the Leather Industry, C. H. Bleyenheuft reported on the first results of his experiments with latex in tanning small skins to improve their quality. The main difficulty met with in attempting to impregnate fabrics with latex has been that the rubber particles did not penetrate the interstices between the fibers. This difficulty, however, has been overcome by the use of sulphanilate of soda or sulphonated oils. Fish oils have been found most suitable for treating leather; despite the addition of these oils to latex, though, it remained a very difficult problem to insure the penetration of latex to the core of the leather.

Mr. Bleyenheuft then dehydrated the leather first in a solution of carbonate of potash. This dehydration, it may be added, has no deteriorating effect on the leather. Pieces of dehydrated sheepskin were immersed in a mixture of latex to which some wetting agent, like sulphonated fish oil, was added; and after soaking for twenty-four hours the skins were found to be entirely impregnated with latex. When the skins had next been dipped in a solution of oxalic acid and dried, the resulting leather proved to be flexible, resistant, and perfectly impermeable. The leather can also be dyed by means of an alcoholic solution of an alumina color. If care is taken to add a certain amount of hyposulphate to the latex, vulcanization of the rubber takes place in the interior of the leather under the action of the alcohol which penetrates the leather.

[1] *Rev. gén. caoutchouc*, Jan., 1936, p. 21.

Determination of Free Sulphur in Rubber

THE following rapid and accurate volumetric method of determining free sulphur in rubber is quoted from a recent paper by E. W. Oldham, L. M. Baker, and M. W. Craytor, The Firestone Tire & Rubber Co., Akron, O.[1]

Procedure

Place 2 grams of thinly sheeted sample 0.05 to 0.075 cm. (0.02- to 0.03-inch) in a 400-cc. Underwriters' flask. Add 100 cc. of 5% sodium sulphite solution, 5 cc. of a 0.1% sodium stearate suspension in water, and approximately 1 gram of paraffin. Cover the flask with a small watch glass and heat so as to boil gently for two hours. Remove the flask and add 100 cc. of 0.5% strontium chloride solution and 10 cc. of 3% cadmium acetate solution. Separate the rubber and precipitates by filtration, using a Büchner funnel with suction. Wash with two 75- to 100-cc. portions of a wash solution containing 40 cc. of 3% cadmium acetate solution per liter. (The funnels are prepared by forming a thin asbestos pad over a single sheet of qualitative filter paper. Filters thus prepared can be used numerous times.) To the filtrate add with stirring 5 cc. of 40% formalin solution, 10 cc. of glacial acetic acid, and 5 cc. of 1% starch solution. Add enough crushed ice to bring the temperature of the solution below 15° C., and titrate with a standard solution of iodine to a blue end point. A blank determination is run on the reagents, and this figure, usually 0.2 to 0.3 cc., is subtracted from the titrations on the samples.

In addition to all common fillers, softeners, etc., the following compounds have no effect upon the accuracy of the method: thiocarbanilide, guanidines, aldehyde amines, tetramethylthiuram monosulphide, mercaptobenzothiazole, benzothiazyl disulphide, *p*-aminophenol, naphthylamines, xanthates, carbamates, and vulcone.

Accelerators such as tetramethylthiuram disulphide, which also function as vulcanizing agents, liberate the available sulphur during the heating with sodium sulphite and the thiosulphate thus formed influences the accuracy of the free sulphur determination on such stock. This is perhaps no serious handicap because gravimetric results on such stocks are of no particular value because of the high percentage of organically combined sulphur in the acetone extract.

Conclusions

Values obtained by the volumetric method described compare favorably with those obtained by gravimetric methods when corrections are applied to the latter for the sulphur in the organic compounds in the acetone extract.

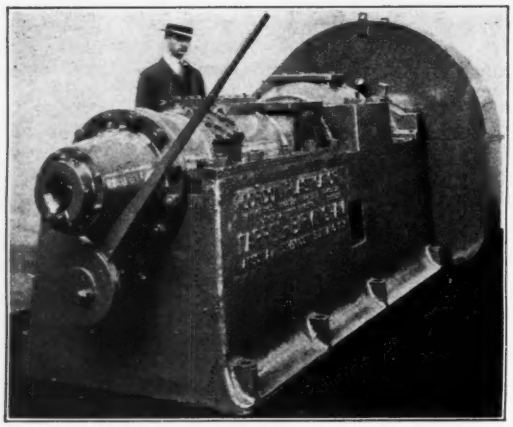
The precision of the method is excellent, as duplicates in each set usually check within 0.01% of free sulphur on the compound.

This method is much faster than previous methods.

The cost of the reagents is low when compared with most other methods.

[1] Presented before the Division of Rubber Chemistry, American Chemical Society, Akron, O., September 30, 1935. Abstracted from *Ind. Eng. Chem.* (Anal. Ed.), Jan. 15, 1936, pp. 41-42.

New Machines and Appliances



Gordon Plasticator

Improved Plasticator

WHERE large tonnage of crude rubber is handled, the plasticator pictured has been found an ideal machine for a hot breakdown. Its numerous and efficient jacket circulations give close control of temperature, and the principles involved in its two-stage mastication give uniformity of softness and temperature, regardless, in large measure, of the skill and attention of the operator—he sees to it that the machine is properly fed—the rotor and the head do the rest.

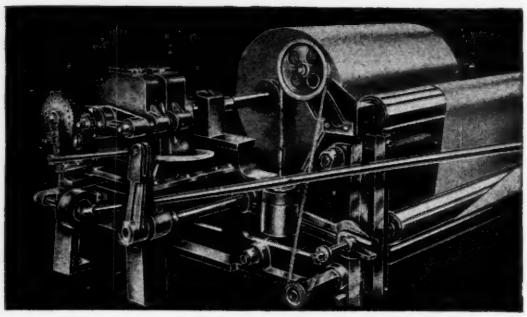
The latest model twenty-inch plasticator produces rubber by the hot method at the rate of 10,000 pounds per hour with a horsepower of 625 to 650. The plasticity obtained is considerably better and more uniform than that reached by milling 200 pounds on an 84-inch mill for fifteen minutes. Although extruded at an average temperature of 365° F., no further oxidation takes place because the extruded tube is slit, flattened by passing over a couple of light rollers on to a woven wire conveyer apron, and sprayed on each side by cold water. After the passage of the gum over the conveyers and the knife which cuts it to length, the temperature is about 300° F. For each horsepower hour actually delivered to the machine sixteen pounds of rubber are plasticized. Farrel-Birmingham Co., Inc., Ansonia, Conn.

Automatic Web Tension

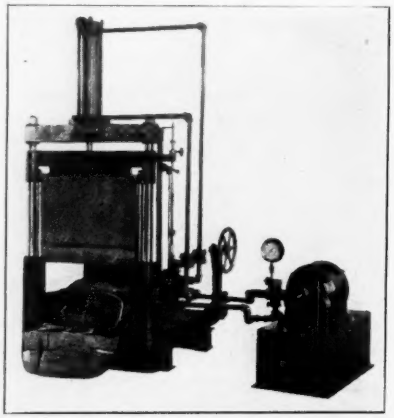
THE automatic web tension device here illustrated is of great value on any processing machine that includes the unwinding of a web from a roll. It provides uniform tension on the web of material, whether paper or fabric, regardless of the change in speed of the slitter, press, or other processing machine to which it is attached. This device permits a press, for instance, to be stopped and started up again without changing the register on the printed web, such as would occur with a manually operated mill roll friction control, owing to variation in the web tension.

The control of the web is secured by a counterweighted floating roller, over which the web passes. The uncounterweighted weight of this roller therefore determines the tension, and the roller directly controls the braking element by means of a system of levers and gears. The tension is controlled directly from the web and is independent of the diameter of the roll being unwound. Water cooled mill roll friction assures smooth, cool running at high speed.

This device is entirely mechanical in operation. The roll can be adjusted to the handling of light or heavy materials, by increasing or decreasing the amount of counterweighting. A very sensitive control can thus be established. Cameron Machine Co., 61 Poplar St., Brooklyn, N. Y.



Cameron Automatic Tension Device



Hydraulic Crude Stock Cutter 4-KBW

Crude Rubber Bale Cutter

THE machine pictured will accommodate and cut the various shaped bales of crude rubber. It is self-contained, rapid and efficient, possessing many advantages over other cutters for this type of work. The use of water, or any other cutting lubricant, is not necessary. The stock is fed forward to the cutting position by turning the handwheel shown. After tripping the knife-operating lever, the knife makes the cut and automatically returns to its starting position. The standard machine will make approximately three cuts per minute when the full stroke is used. When small or flattened bales are being cut, there will be an increase in the number of cuts per minute, the rate of increase being in proportion to the stroke used. While the self-contained unit is recommended, it is practical to use this machine with suitable cylinder, on plant pressures ranging from 500 to 1,000 pounds per square inch and having capacities of 20 to 35 gallons per minute, the capacity being in inverse proportion to the pressure. The Black Rock Mfg. Co., Bridgeport, Conn.

Velometer

THE "Alnor" Boyle System Velometer is made in three types for indicating directly on the scale the air velocities in feet per minute without the necessity of timing or any mathematical calculation.

The shutter type of this instrument is used generally in warm air heating service where velocity conditions in rooms or large spaces permit holding the Velometer in the air stream while obtaining the velocity reading. It is self-contained and has no attachments. To change the reading range, it is

Shutter Type Velometer

merely necessary to turn a shutter located on the left of the meter case to open or close the ports.

The shutter type is ideal for taking quick commercially accurate readings in spaces not too confined. It should not be used for accurate readings of small-volume high-velocity air streams. The tube type with suitable jet should be used for this service to avoid the necessity of placing the meter directly in the air stream. Illinois Testing Laboratories, Inc., 420 North La Salle St., Chicago, Ill.

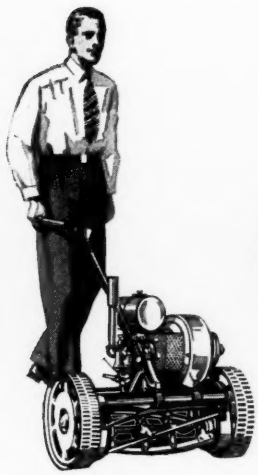
Electric Process Kettle

ELECTRICALLY heated process kettles are ideal for chemical process work, oil treatment, for the manufacture of synthetics, and in rubber plants for preparing special adhesives, etc. Such kettles can be procured in stainless steel, aluminum, plain steel, and other materials. They are equipped with special unipower drives and with stirrers of any type. They are supplied with automatic control, are safe in operation, and can be had in sizes up to 1,000 gallons capacity. Patterson Foundry & Machine Co.

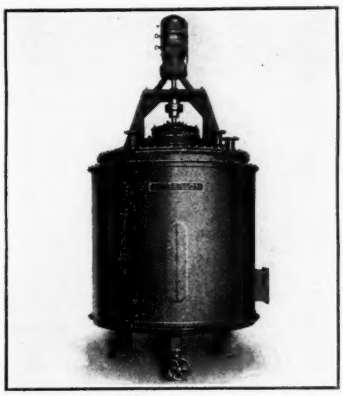
Rubber Tired Power Lawn Mower

RUBBER tires are a popular feature of this 1936 lawn mower because they are quiet-rolling and cause no damage. "One-Hand" control is still the big feature of this machine, a simple rotating hand grip giving free-wheeling for trimming. A pull on the grip automatically disconnects the wheels while the cutting reel keeps whirling. When the handle is dropped, both reel and wheels stop. The far-forward location of the cutting bar and reel enables one to trim six inches closer to shrubs, trees, and walls than by a hand mower.

Lawn-Boy cuts an eighteen-inch swath, and will mow up to three acres a day. There are four cutting heights, 5/8 to 1¾ inches. Speed is governor-controlled from 2 to 3½ miles per hour. Outboard Motors Corp.



Evinrude Lawn-Boy



Patterson Electric Process Kettle

Thwing Portable pH Meter

Berstorff Automatic Stock Cutter

Stock Cutter

THE illustration represents an automatic machine for cutting stock to lengths as it is delivered from a tuber or a profiling calender. The cutting means consists of four disk knives adjustable for spacing the cuts. The material to be cut is carried on a conveyer and during its travel is cut into equal-length pieces. The speed of the conveyer and of the knives is regulated by means of a regulatable motor drive. Hermann Berstorff Maschinenbau-Anstalt G.m.b.H.

Portable pH Meter

THE portable pH meter pictured was especially designed for quick and accurate pH determinations either in the factory or in the laboratory. It is potentiometric in principle, which makes it independent of color or turbidity in the solution being measured, and yet it is extremely simple to operate and reads directly in pH units. Readings up to 12 pH can be easily obtained on latex or other strongly alkaline solutions in a few minutes' time with its rugged stick antimony electrodes; and, if necessary, successive readings can be made at intervals of two minutes or less.

Readings of pH of clay or heavy viscous materials can likewise easily be obtained with the antimony electrodes, with no danger of breaking them, either during the reading or in cleaning them afterwards. Platinum-quinhydrone electrodes are equally convenient and reliable for the acid range, down to zero pH.

No preliminary standardizing of the circuit or electrodes is required. It is only required to put the solutions into the electrode vessels, insert the electrodes, and take the reading. No millivolt-pH table or temperature corrections are necessary. The instrument reads the pH directly. Thwing-Albert Instrument Co.

Rubber Industry in America

OBITUARY

Charles B. McCloskey

CHARLES B. McCLOSKEY, Pittsburgh district manager of the R. & H. Chemicals Department of E. I. du Pont de Nemours & Co., died February 11, after a short illness. Funeral services were held February 15 at Brooklyn, N. Y., where he was born forty-nine years ago.

Mr. McCloskey joined the Roessler & Hasslacher Chemical Co. (which later became the R. & H. Chemicals Department of the du Pont company) on November 1, 1905. After holding various positions in the general sales department, he was transferred in the Spring of 1924 to Pittsburgh as manager of that district, in which post he remained until his death.

J. Smith

J. (ALF) SMITH, 62, founder and designer of the Belgrave cable cord pneumatic tire, passed away February 25 at Wokingham, England. He was widely known throughout the tire trade in Britain, the United States, Canada, New Zealand, and Australia, where his activities as a maker of cord tires first started. He was also known as "Spencer-Smith" on the Pacific Coast and won quite a reputation as a tire salesman for the United States Rubber Co.

Mr. Smith leaves his wife, two brothers, and two sisters.

Albert Theilgaard

FROM abroad comes the sad news of the death of Albert Theilgaard, founder of Aktieselskabet Dansk Galoche-Og Gummifabrik, Kjoge, Denmark, who passed away March 6 at the age of fifty-nine after a short illness. He was a chemical engineer from the Polytechnic High School in Copenhagen, and in his youth became connected with the rubber industry.

Mr. Theilgaard invented the so-called neutral process for reclaiming waste rubber. He patented one method, using sodium sulphite, in 1899, and another, using zinc chloride, in 1902. These processes he employed at the factory he started in Copenhagen, which was the first reclaiming plant on the Continent. After several years the plant was moved to Kjoge, where from 1914 to 1918 the manufacture of rubber goods other than reclaim was begun. After the World War the company took up the manufacture of rubber footwear, now its principal product.

In 1924, however, with the failure of several banks the firm went bankrupt, and Mr. Theilgaard was accused of fraud and even arrested for a short while. To prove his innocence he studied law, and after a long and hard fight defending himself, he was vindicated, not only being acquitted, but also receiving the largest compensation ever paid by the Danish State.

Albert Theilgaard

After this unfortunate episode Mr. Theilgaard drifted away from rubber and devoted himself entirely to law studies. He had, though, the satisfaction of seeing his factory reopened and continuing to progress until now it is the largest rubber factory in Denmark.

E. E. Dorman

A HEART attack, February 29, caused the sudden death of Erastus Elmer Dorman, president and treasurer of the Haverhill Rubber Co., Haverhill, Mass., from 1907, when he organized the company, until he sold it in 1929, retiring from business.

The deceased was born in Beddington, Me., May 12, 1861, and attended local public schools and Cannon's Business College, Lawrence, Mass. After several years as a watchmaker and then proprietor of a variety shop, Mr. Dorman became manager of the Crocker System Rubber Stores at Manchester, N. H., and Lowell, Mass., where he remained until he started his own company in 1907.

He belonged to the Grace Methodist Episcopal Church and the Lawrence lodge of the Odd Fellows.

His survivors include a son, a sister, and a brother.

Ludovic T. Kuhl

LUDOVIC T. KUHL, of Pennington, N. J., died February 29 from pneumonia. He was born in Trenton sixty-one years ago. After graduating from a business college he became a bookkeeper for a furniture firm. He was later employed by the old United & Globe Rubber Co. and then became salesman for the Thermoid Rubber Co. At the time of his death he was engaged in the real estate business. Mr. Kuhl was a member of the Pennington borough council and Trenton Lodge of Elks. He is survived by his wife. Burial was in Greenwood Abbey, Trenton.

Frank E. Smith

FRANK E. SMITH, of Providence, R. I., active in the tire and rubber business there for the past seven years, died March 19 after a month's illness. He was born September 5, 1889, in Taunton, Mass., where he was educated. He entered the rubber business about twenty years ago and conducted a store in Lynn, Mass., for several years. Then about seven years ago Mr. Smith came to Providence as the local manager for the Goodyear Tire & Rubber Co., and later became local manager for Thomas E. Hogan, Inc., the Fisk Rubber Co. agency. He is survived by two sons, two daughters, and a brother. He was a member of the Massachusetts branch of the Catholic Order of Foresters.

Rubber in America

Mexico, prior to 1913, possessed several scattered plantations of *Hevea*; also many larger areas then were planted with the local Castilla trees. The most important area under *Hevea* was probably that reopened temporarily by the Firestone company in 1927, later again abandoned. The Mexican plantings have been unproductive for many years—the area may be roughly estimated at 500 acres.

Trinidad plantings of many years ago yielded 68 tons of rubber in 1926 and 59 tons in 1927. Possibly 500 acres of rubber (mixed species) are planted there.

It is reported that about 30,000 seedlings from the Philippines were planted in Panama during the first half of 1935.

Plantings of *Hevea* have produced seed in Florida, in connection with the experiments of the U. S. Department of Agriculture.

FINANCIAL[1]

American Hard Rubber Co., 11 Mercer St., New York, N. Y. For 1935: profit after ordinary taxes, depreciation, and other charges, but before federal taxes, $145,727, contrasted with net loss of $15,329 in 1934. Capital stock consists of 22,682 shares of $100-par, 8% preferred, and 65,503 shares of $50-par common.

American Zinc, Lead & Smelting Co., Columbus, O., and subsidiaries. Quarter ended December 31: net loss after depreciation, depletion, federal taxes, and other charges, $50,909, compared with $58,799 loss in the preceding quarter and $41,188 loss in the December quarter of 1934.

Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. For 1935: profit on manufacturing operations, $2,942,125, against $2,535,183 in 1934; miscellaneous income, $37,808, making a total income of $2,979,933. After deductions for selling, administrative expenses, federal taxes, and depreciation, net income for the year, $1,029,401, compared with $821,801 for the prior year.

Columbian Carbon Co., 41 E. 42nd St., New York, N. Y. For 1935: net profit, $2,992,860, or $5.56 a share on 538,420 shares of common stock, compared with $2,111,367, or $3.93 a share, in 1934. Of total sales of $11,748,644 last year, carbon black comprised $5,073,836, or 43.19% and natural gas $3,052,034, or 25.98%. In his report F. F. Curtze, president, says that for the first two months of this year sales of natural gas were 50% larger and total sales of all products 15% greater than in the same months of 1935.

Collyer Insulated Wire Co., Pawtucket, R. I., and subsidiaries. For 1935: net income, $107,055, equal to 77¢ a share on 139,000 capital shares, against $83,337, or 60¢ a share in 1934.

Fisk Rubber Corp., Chicopee Falls, Mass., and subsidiaries. For 1935: net loss of $274,775, after depreciation, federal income taxes, etc., against net profit of $728,697, equivalent, after 6% preferred dividends, to $1.15 a share on the common stock in 1934. Consolidated balance sheet as of December 31, 1935, shows total assets of $12,660,045 and total surplus of $7,532,165 compared with $13,341,128 and $7,872,719, respectively, at end of 1934.

In the annual report to stockholders, Edward D. Levy, president, said, in part: "Our net sales increased $650,081, or 6.36% over 1934. The net loss for 1935 was caused by increased manufacturing costs, principally in the price of rubber, which increased costs were not offset by an increase in the industry's sales prices.

"Taxes of all kinds covering the year's business for 1935 amounted to $1,185,834, or more than four times our loss of $274,775; or equal to approximately $2.70 per share of common stock outstanding."

Garlock Packing Co., Palmyra, N. Y., and subsidiaries. For 1935: net income after depreciation, interest, amortization, inventory adjustments, federal taxes, and other charges, $695,585, equal to $3.32 a share on 209,250 no-par capital shares, excluding 4,715 shares in treasury. In 1934, net was $562,175, or $2.85 a share on 196,930 shares.

B. F. Goodrich Co., Akron, O. For 1935: consolidated sales of $118,669,013, against $103,871,717 in 1934. In years prior to 1935 the company treated outbound transportation, excise taxes charged to customers, and cash discount allowed as commercial expense. Because of the increasing amount of these items, the management decided at the beginning of 1935 to treat them as deductions from sales. On the basis followed prior to 1935, consolidated sales would have been $128,117,897 for the year, an increase of 23.34% over net sales of 1934. Net profit for the year, after providing for depreciation, interest and federal income tax, and deducting profit of subsidiaries applicable to capital stock of such companies not owned by the Goodrich company, amounted to $3,429,781, or 2.81% on sales. This compares with $2,534,679 in 1934. After deducting profit on sales of securities and non-recurring items from both years, the profit from ordinary operations was $2,780,698 in 1935, compared with $1,533,800 in 1934. Raw materials on hand and material content of unfinished and finished goods were valued at the lower of cost or market on December 31, 1935. Raw materials under contract were at prices below market prices on December 31, 1935. Total current assets at the close of the year amounted to $68,259,561, and current liabilities to $13,609,655, giving a ratio of 5 to 1. The results of operations of the Hood Rubber Co., Inc., Watertown, Mass., were included from July 1 to December 31, since it became a subsidiary company in June, 1935.

Goodyear Tire & Rubber Co., of California, Los Angeles, Calif., and wholly owned subsidiaries. For 1935: net loss after depreciation, taxes and other charges, $44,358, contrasted with net profit in 1934 of $130,746, equal to $1.65 a share on 79,116 shares of $100-par 7% cumulative preferred stock, on which is an accumulation of unpaid dividends. Entire common stock owned by Goodyear Tire & Rubber Co., Akron, O.

Intercontinental Rubber Co., 745 Fifth Ave., New York, N. Y. For 1935: net loss after depreciation, $92,543, against net loss of $110,063 for 1934; profit from operations, $98,922, against $102,660; operating loss, after $58,482 shutdown expenses of Mexican plants and California properties in 1935, $17,667, against $12,648 operating profit after $36,054 shut-down expenses in 1934; current assets, $372,035, against $458,184; current liabilities, $26,128, against $40,608.

Monsanto Chemical Co., St. Louis, Mo. For 1935: consolidated net earnings, $4,009,872. After providing for minority interests and preferred dividend requirements of subsidiary companies earnings available to the common stock were $3,843,390, or $3.84 each on the 999,123 shares outstanding. In 1934 earnings were $2,771,629, or $3.20 each on the 864,000 shares then outstanding. Net current assets are reported at $9,031,284, an increase of $1,490,452 over the previous year. Total assets increased from $26,904,720 to a new high of $35,839,665 at the end of 1935. It is stated that $3,739,129 was invested in plant last year, and that an additional $1,283,274 was spent for repairs. Research expenditures were $687,978. The statement gives effect to the conversion of the notes issued last year. The common shares now constitute the only capital stock of the company, and all funded debt has been eliminated.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., and subsidiaries. For 1935: net income, after deduction of depreciation, depletion, and losses and expenses in connection with property removals, but before federal and state income taxes and provision for pensions and relief, was $14,216,860; final net income, $11,398,739. Cash dividends declared and paid to stockholders at the aggregate rate of $2.90 a share amounted to $6,426,070. During 1935, $843,820 was charged against reserves for contingencies (created in 1932) for depreciation and obsolescence of idle plant capacity and $48,315 for maintenance of such plants. This charge of $843,820 is in addition to $3,579,618 of depreciation charged to current operations. On December 31, 1935, current assets amounted to $45,013,998, and current liabilities, $9,061,489. Net working capital was $35,952,509. This compares with December 31, 1934, figures as follows: current assets $35,437,984; current liabilities $4,875,665; net working capital $30,562,320. Cash and marketable securities amounted to $21,440,873 at December 31, 1935, against $15,965,530 at December 31, 1934. Current notes and accounts receivable were $7,175,556 at the end of 1935, as compared with $5,682,418 the year before. Inventories totaled $16,397,568 at December 31, 1935, compared with $13,790,036 the previous year-end. These are net amounts after deduction of appropriate reserves. Total taxes paid or accrued in 1935 reached $3,208,243, against

(*Continued on page* 84)

[1] "Dividends Declared" on page 92.

OHIO

BUSINESS in Ohio seems good, although, naturally, the rise in industrial operations was curtailed when storms and unprecedented floods did untold damage and caused temporary cessation of activities in some localities. No great improvement, though, is expected in business in general for 1936, owing to the uncertainties of a presidential election and proposed legislation in Washington. The weather looms more important than ever this year as a factor in industrial improvement.

The steel industry, however, is operating at a much better rate than a year ago, and machine tool builders reported the heavy volume of orders received in February continued through March.

Tire companies and plants not affected by strikes increased production recently, and the output for the entire industry is thus being maintained at normal levels for this season. The increase in tire production, though, is held temporary, and it is not believed the output for 1936 will exceed that of '35. Mechanical rubber goods have been moving in good volume the country over, and it is figured this year's production will be 10% higher than last year's. The shoe industry also just completed an excellent season on heavy goods, and advance orders for tennis shoes, etc., are coming in at a very satisfactory rate. Insulated wire is moving better, but is still very slow when compared with 1929-1930. But in some branches of this industry production has been very good, as, for example, ignition cable, which, of course, follows automobile production. Wire, it is thought, is farther behind the 1929 level of production than any other branch of the rubber industry.

In view of the rising cost of the raw material it would seem that prices should increase very shortly in all rubber lines. Many persistent rumors have it that an increase in tire prices could be expected soon. In view of the many uncertainties confronting the country as well as the rubber industry it is very difficult as yet to estimate whether tire sales this year will exceed those of 1935.

Staff Superintendent

Joseph B. Hanan, staff superintendent, mechanical goods division, The B. F. Goodrich Co., Akron, O., was born on a farm in Medina County, O., February 10, 1889. At twelve he entered the village high school, from which he was graduated at sixteen, the only member of his class. Then for a year and a half he labored on the farm and at any other work he could find, most of which consisted in acting as engineer on a threshing outfit.

It was necessary for him to work his way through college, but he was graduated from Buchtel College, now the University of Akron, in 1910, with degree of Ph.B. He began teaching in Wadsworth High School and after two years was made superintendent of the Auburn, O., schools. From here he went to Kent Normal College, now Kent State University, as rural training supervisor and developed the Brady Model School and the Ravenna Consolidated School, in cooperation with the college, teaching on its faculty. At the same time business always held a fascination for Mr. Hanan; so one summer, in addition to his professional duties, he worked on the sales force of the Buick Motor Co. with much success.

Joseph B. Hanan

In May, 1918, he resigned from the teaching profession and joined Goodrich, entering the mail sales department. Since letters played such a prominent part in successful mail sales work, Mr. Hanan waged a winning campaign to improve Goodrich correspondence in all lines. Next he was asked to take over the management of the stenographic, multigraphing, advertising distribution, and related departments. From this he soon became assistant office manager, which post he held until 1928, when he went into the production field to help reorganize the numerous activities of the mechanical goods division and work out better order handling and service rendering methods. After a short time he was made assistant staff superintendent and then when the then staff superintendent was promoted to merchandising manager, Mr. Hanan stepped into his place as staff superintendent, October 1, 1931.

In the meantime Mr. Hanan has served as president of the Akron Board of Education, chairman of the Akron Chamber of Commerce Educational Committee, member of the Goodrich Sales and Field Training School Faculty, and is now vice chairman of the board of trustees of Kent State University.

He is a Mason, a Methodist, is married, and has one daughter.

The B. F. Goodrich Co., Akron, recently presented cash awards for suggestions on conduct of the company's business to the following twelve members of the field organization: J. E. Duffy, New York, N. Y., (two awards); J. A. Broom, Miami, Fla.; Irl R. Barker, Nashville, Tenn.; J. N. Davis, Milwaukee, Wis.; Don Feece, South Bend, Ind.; Clarence D. Gutknecht, Cincinnati, O.; J. J. Prodoehl, Baltimore, Md.; Maude Sewell, Atlanta, Ga.; T. J. Wakely, Akron; R. J. Kinaman, Oklahoma City, Okla.; F. J. McCammon, San Francisco, Calif.; P. G. Reed, San Bernardino, Calif.

The Ohio Rubber Co., Willoughby, recently announced its opening of a series of industrial training courses for employes interested in adult education. The courses not only include classes in industrial training pertinent to the work at the plant, but also courses of a general nature. The plan is an elaboration of the former apprentice training school. The faculty of the new school will include company employes well qualified for the work. Employes who enroll for courses are given training at no cost. All expenses are defrayed by the management, according to C. W. Ufford, of the personnel department.

Automotive, molded, and extruded rubber products will be featured by the Ohio Rubber Co. at the Great Lakes Exposition, Cleveland, June 27 to October 4, according to Franklin G. Smith, company president. The firm's display will be in the Lakeside Exhibition Hall, with L. H. Weber in charge. The exposition is designed to portray the industrial, commercial, and cultural activities of the Great Lakes area. The exposition grounds occupy a portion of Cleveland's famous Mall and extend a mile along the city's lake front.

Goodyear News

Under an order entered March 5 by the Federal Trade Commission, Washington, D. C., the Goodyear Tire & Rubber Co., Akron, its subsidiaries, and their officers, agents, etc., are directed to cease and desist from discriminating in price between Sears, Roebuck & Co., Chicago, Ill., and Goodyear's retail dealer customers by selling automobile tires to Sears, Roebuck at net realized prices lower than those at which Goodyear sells the same sizes of tires of comparable grade and quality to individual tire dealers or other purchasers.

(*Continued on page 86*)

EASTERN AND SOUTHERN

WHILE the upturn in some fields of business should make the second quarter of 1936 the best this year, experts believe in most cases it is not likely to result in gains so great as those experienced in so many branches of industry the second half of last year. At present a wave of increased purchasing is just getting under way, following the slow-down since last fall.

Attention is now directed to rebuilding and refurnishing the flood-swept sections of the nation.

The present outlook in the rubber industry is quite good, based on sales, shipments, and consumption of crude rubber and chemicals.

Radio factories in Philadelphia and Camden made a new high record for output last year, and indications are that the showing will be exceeded this year, as combined production thus far is about 17% ahead of the like period a year ago.

In the South flood damage, highway operations, building, and planting will absorb all the district's rough labor, and, for the first time in years, workers will be a premium this spring.

The oil industry continues to reflect improving conditions, with another advance in crude oil freely predicted.

The nation's unemployment in manufacturing declined from 3,597,000 persons in January, 1934, to 2,824,000 in January, 1936, approximately 22%. The Labor Bureau's index of manufacturing employment in February stood at 83.3, the highest for the month since 1930. The February, 1936, payroll index number was 72.3. In both cases the numbers present a slight gain over January's figures.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has appointed Edward J. Bernhardt manager of the Pittsburgh office of its R. & H. Chemical Division.

United Carbon Co., Charleston, W. Va., recently purchased the Monroe gas field properties of the Texas-Louisiana Producing & Carbon Co. for $50,000.

Endicott Johnson Corp., Johnson City, N. Y., will soon erect a new five-story factory for the manufacture of rubber footwear. When completed, company officials estimate in about a year, the plant will employ four hundred workers on winter rubber footwear of all kinds. This new unit, providing more than 50,000 square feet of floor space, will supplement the E. J. Sunrise factory, which has been experiencing a big demand for its output. Company officers behind this move are George F. Johnson, chairman of the board; George W. Johnson, president; and Charles F. Johnson, Jr., vice president and general manager.

R. D. Gartrell

New York Group Chairman

Robert Derby Gartrell, chairman of the New York Group, Rubber Division, American Chemical Society, is also technical manager of the mechanical division of United States Rubber Products, Inc., One Market St., Passaic, N. J. He has had an interesting and varied career which began with his graduation from Georgia Tech in 1916 with a B.S. in chemistry.

But the first job the Georgian (he was born in Atlanta, January 27, 1895) secured was in Montreal, Canada, as chemist with Milton Hersey Co., Ltd. In 1917, however, he transferred his activities to the Dominion Rubber Co., Ltd. After two years as research chemist at the Montreal plant Mr. Gartrell was assigned to the Kitchener factory where he established footwear laboratories and became footwear technical superintendent. Then, in 1920, he returned to the Montreal division as assistant footwear manager and became director of development in 1929. His next change in position took place in 1931 when he was sent to U. S. Rubber in Passaic as assistant director of development.

Mr. Gartrell also belongs to the Society of Chemical Industry and the Institution of Rubber Industry, both English organizations.

His hobby is the breeding of delphinium, in which he has been engaged for the last ten years. He grows several thousand of these every year—more for breeding experiments than for anything else.

Mr. Gartrell is married to the former Nancy H. Reynolds, of Atlanta, by whom two daughters, Jean, seventeen, and Elizabeth Anne, ten.

Dr. Clement C. Williams, president, Lehigh University, in a recent address on "New Demands in Engineering Education" at the Engineers Club, 1317 Spruce St., Philadelphia, Pa., predicted rubber tires for street cars probably would be one of the next developments in the anti-noise campaign.

Robert Emmet Murray, since May, 1917, purchasing agent of The Kelly-Springfield Tire Co., Cumberland, Md., resigned March 1 to join the Sylvania Industrial Corp., 122 E. 42nd St., New York, N. Y., in a sales capacity.

The Texas Centennial Exposition, the Southwest's first World's Fair, to cost about $25,000,000, will be held in Dallas, June 6 to November 29, in celebration of Texas becoming an independent republic, when it broke away from Mexico in 1836, and the century of progress since achieved. Among the list of exhibitors for this exposition are: Ball Bros. Co., Muncie, Ind.; E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; Firestone Tire & Rubber Co., Akron, O.; Ford Motor Co., Dearborn, Mich.; General Electric Co., Schenectady, N. Y.; Harley Davidson Motor Co., Milwaukee, Wis.; and Westinghouse Electric Co., East Pittsburgh, Pa.

Safety Tire & Rubber Co., retreader of used tires, 29-20 Fortieth Ave., Long Island City, N. Y., was completely burned out by a fire of undetermined origin that lasted several hours on February 25. Thomas F. Gallagher, a partner in the firm, placed the damage at over $100,000.

Titanium Pigment Co., Inc., 111 Broadway, New York, N. Y., has closed its Niagara Falls plant and sent the personnel to manufacturing units at St. Louis, Mo., and Sayreville, N. J. The Niagara Falls plant was shut down once before, but resumed producing operations in 1933 when a shortage occurred in the supply of titanium oxides. It was the company's smallest producing unit, and officials planned to end operations there when the huge plant at Sayreville opened last year.

Appellate Division of the Customs Court, upholding a decision handed down last July, on March 2 ruled that imported rubber soled canvas footwear is properly dutiable on an American selling price basis. This decision hits Japanese producers severely, requiring them to pay a 35% ad valorem duty on a value basis of 59 to 69¢ a pair, less trade discounts, on rubber soled footwear. Under the former valuation the same percentage of duty was assessed on a foreign value ranging from 8.8 to 14¢ a pair. Czechoslovakia is another major exporter of the type of footwear affected. Besides higher value basis, the Japanese footwear is also subjected to an anti-dumping duty under an order put into effect in September, 1933.

Safety Conference

The Seventh Annual Greater New York Safety Conference was held at the Astor Hotel, New York, N. Y., March 3-5. The conference was largely attended, and at its sessions safety problems were discussed in numerous papers in the programs of thirty-five different sections.

The section on Safety Training, Chairman Cyrus S. Ching, Director, Industrial and Public Relations, United States Rubber Products, Inc., 1790 Broadway, New York, presented the following papers: "Foreman Training—The Key to Efficiency;" "Changing Poor Attitudes into Good Attitudes," A. A. Nichoson, Manager of Personnel, The Texas Co., New York; "The Unknown Quantity—The New Man," Hardy M. Cook, Director of Personnel, Brooklyn Edison Co., Brooklyn, N. Y. These papers had special appeal and interest to industrial plant managers where safety and efficiency are of momentous significance.

F. B. Davis, Jr., president, United States Rubber Co., 1790 Broadway, New York, recently made the following remarks:

"With a problem as serious as the one we are facing, concentrated and cooperative action is, to my mind, the only possible means of gaining the desired results and with such action, I have not the slightest doubt that automobile accidents will be reduced to a minimum.

"I say this because I know from personal experience what can be accomplished by such cooperative action. No longer than twelve years ago the rubber industry was considered a hazardous industry. At that time we undertook to correct this condition in all of our factories and to make 'U.S.' one of the safest companies in the country. A careful study of the situation was made, and it was found that accidents could be grouped into two classifications; one, accidents caused by equipment deficiencies, and the other, accidents caused by careless workers. Having determined this, we set about correcting both conditions with the result that in twelve years accidents in the entire rubber company dropped from an average of 1,142 per year in 1923 to 198 in 1935. This remarkable result, I am convinced, was attained only through the cooperation of every man in the organization."

The St. Joseph Lead Co., 250 Park Ave., New York, N. Y., is operating at 40% of capacity, President Clinton H. Crane told stockholders at their annual meeting March 12. The volume of lead business in general in this country is about 10% higher than last year, Mr. Crane reported. However the balance between production and consumption was still narrow, and stocks still were large. Stanley A. Easton, president of the Bunker Hill & Sullivan Mining Co., was elected a director of the lead company.

N. A. W. M. D. Convention

The National Association of Waste Material Dealers, Inc., held its twenty-third annual convention March 16, 17, and 18 at Hotel Astor, New York, N. Y. The sessions were well attended by leaders of the industry from all sections of the country. At the annual banquet March 18 the principal speaker was Merle Thorpe, editor, *Nation's Business,* Washington, D. C. He pointed out that salvaging the materials from obsolescent products and machinery had an important bearing on the progress of new things, new ways of life, new ideas that characterize the American tempo.

E. B. Friedlander, of Chicago, was reelected president of the association at the closing business session of the convention. Joseph Shapior, of Baltimore, J. V. Spachner, of Chicago, and Harry Goldstein, of Philadelphia, were chosen vice presidents, and Charles M. Haskins, of New York, was reelected secretary and treasurer.

New Income Tax

New York State has enacted a new income tax law on all unincorporated businesses. The Department of Taxation and Finance of the State at Albany urges those affected to familiarize themselves with the conditions of this law and to prepare their returns at once. The due date is April 15, and the law provides penalties for those who fail to comply with the requirement on or before midnight that date.

Parr Rubber Key Co., 160 Varick St., New York, N. Y., has changed its address to Parrot Speed Fastener Corp., Rubber Goods Division, 36-18 Northern Blvd., Long Island City, N. Y.

Chemical & Pigment Co., Baltimore, Md., subsidiary of the Glidden Co., Cleveland, O., which manufactures lithopone, titanolith, and other chemicals, has given out a contract for the erection of a one-story addition, 107 by 280 feet, to supply more room for production. H. L. Rhodes is manager.

Federal Trade Commission, Washington, D. C., among its recent formal complaints listed the following: Economy Rubber Products Co., Dayton, O., engaged in the sale of tire patches, alleged to misrepresent in its advertising the effectiveness of the products and the earnings that may accrue to agents therefor; American Character Doll Co., Inc., 200 Fifth Ave., New York, N. Y., engaged in the sale of dolls, alleged disparagement of competitors' products. Among the commission's orders to cease and desist was one against General Tire & Rubber Co., Akron, O., engaged in the manufacture of automobile tires, directed to discontinue representing that the tires are "blowout proof" and furnishing dealers with advertising matter containing such representations, unless and until the tires are so constructed as to be proof against blowouts.

National Sportsmen's Show

The National Sportmen's Show at Grand Central Palace, New York, N. Y., February 29 to March 7, was the first of the kind held in the city in nearly twenty-five years. The enterprise was highly successful, attracting a total attendance of more than 300,000 visitors.

The many scenic displays shown by the game conservation departments of New York, New Jersey, New England, and the Maritime Provinces were calculated to attract the interest of sportsmen, campers, and tourists intent on finding promising fields for their favorite sports. These scenic appeals were enhanced by exhibits of living specimens of wild life supplemented by samples of the taxidermist's art.

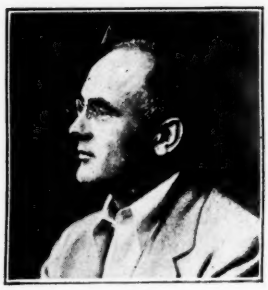
In its commercial features the show comprised a wide range of camp and sports accessories such as firearms, fishing tackle, wading boots, waterproof and warm clothing, etc. Means of shelter and transportation for life in the bush were available in the form of cabins, both permanent and portable, motorcycles, bicycles, canoes, and small sail craft.

A program of sports contests by guides from Maine, New Hampshire, Vermont, and Nova Scotia was given daily at the central feature of the show, an artificial lake or tank 2½ feet deep and 63 by 28 feet in area. The events comprised fly and plug casting for accuracy and distance, log chopping, sawing, and rolling, and canoe tilting. In the latter two sports each contestant was provided with an eight-foot pole on one end of which was attached a large hollow rubber ball. In log rolling this implement served to maintain the balance of the men on the log as they rolled it in the water. In canoe tilting it aided the contestants in pushing each other off balance and overboard.

As rubber in sports is employed more by athletes than by huntsmen and fishermen the few rubber goods exhibited were confined to waders, blankets, ponchos, and coats.

New Jersey Zinc Co., 160 Front St., New York, N. Y., at its annual meeting February 26 announced through President J. E. Hayes that its business in 1936 should exceed that of 1935. In January and February it had been better than expected, and orders on hand exceeded those of a year ago. The retiring directors were reelected.

A. Schrader's Son, Division of Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn, N. Y., has announced the resignation of Service Manager Wm. J. Kirkpatrick, with the company twenty-six years, who has left to join another sales organization. He is succeeded by Service Representative C. H. Wilkens, who will maintain his headquarters at Akron, O. On February 28 a luncheon was tendered Mr. Kirkpatrick by forty of his Schrader associates, who also presented him with a watch.



Wm. B. Wiegand

Binney & Smith Co., 41 E. 42nd St., New York, N. Y., has announced the appointment of William B. Wiegand as director of research for the parent company, Columbian Carbon Co., at the same address. Mr. Wiegand, with Binney & Smith since 1925, directed the study of some of the basic properties of carbon black. During later years the research division of the company has been largely concerned with improvements in the application of rubber and high-grade carbon blacks. This work has resulted in several basic patents and pioneer developments in the field of lacquers, plastics, synthetic yarns, etc. The rounding off of this program in so far as fundamental studies are concerned now makes possible a more intensive study of production problems. Mr. Wiegand, although from now on concentrating on production research, will maintain close relation with Binney & Smith through which he plans to maintain his contacts with the consuming industries here and abroad.

United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., has leased for five years a three-story and basement building at Eleventh Ave. and 48th St., New York. The lease also includes a 25 by 100 foot one-story addition, which the owners are to build on the adjoining lot.

The Kelly-Springfield Tire Co. factory, Cumberland, Md., recently was visited by thirty managers of the K Stores, Kelly-Springfield dealers, to acquaint themselves with factory methods, sales promotion, and advertising plans for 1936. The K Stores are a group of independently owned service stores operating throughout the Boston, Mass., area, organized under Max Katz, of the Merchants Tire Co., who serves as purchaser and merchandising director for the group. Those in charge of the trip were Mr. Katz and Fred Moore and Joseph Steinberg, of the same company, and J. Herbert Rice, of the R. M. Hollingshead Corp., whose plant at Camden, N. J., was visited on the trip. After an extensive study of factory methods at Cumberland, the dealers listened to talks by President Edmund Burke, Sales Manager Henry Sweringen, Factory Manager Harry Soulen, and Advertising Manager Porter Collins.

NEW ENGLAND

FROM the Ohio and Potomac Valleys to Maine the greatest floods of this century in the northeastern section of the country caused untold damages way past the $400,000,000 mark. Manufacturing plants were closed; heavy damage was done machinery; and in New England alone at least 75,000 workers were thus forced into idleness. One consoling factor amid all this havoc is that the temporary halt in current shipments will be followed by heavy purchasing to replace millions of dollars worth of goods ruined by water and mud. Moreover when the reconstruction work in the flood area begins, many industries will benefit thereby.

In sections in New England not hit by the high waters the outlook continues encouraging. Shoes and leather are more active than they have been in several weeks. But the demand for cotton textiles is still slow.

In general the level of operations in Rhode Island rubber manufacturing plants has shown comparatively little change during the first quarter this year, but a very healthy optimism indicates an early revival of activity. Makers of general rubber goods report that the sole feature since the turn of the year has been the maintenance of an active pace on industrial tank linings and rubber roll coverings. The past few weeks have seen greater activity as plants prepare for the usual increase in demand for summer sports goods and bathing apparel and novelties; while sales of rubberized thread have held at the somewhat reduced level which set in after an unusually sharp upturn during the closing months of 1935. Makers of rubber sundries find that demand has held steady and satisfactory, with continued interest in products of higher quality.

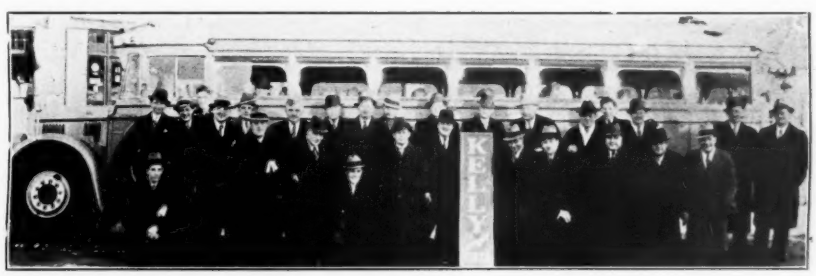
While it is yet too early for manufacturers to gage accurately what the year's volume will be, executives generally see no reason why the total business should not exceed considerably that for 1935. One unsettling factor, however, in the current situation is the recent abrupt rise in the crude rubber market. It is pointed out that rising prices create a problem for those manufacturers who had already sent out price lists which must necessarily be recalled if the cost of crude should go higher. Although the industry is not subject to definite seasonal factors, it is true that demand usually forms a rising curve during the early months and reaches a peak in the late summer and early fall when hospital and surgical buyers place orders for goods for the winter.

Farrel-Birmingham Co., Inc., Ansonia, Conn., held its annual stockholders' meeting February 20, when the following directors were elected: Charles F. Bliss, Franklin Farrel, Jr., Nelson W. Pickering, Frederick M. Drew, Jr., Carl Hitchcock, Franklin R. Hoadley, Armin G. Kessler, Julius G. Day, Fernley H. Banbury, William B. Marvin, Edward H. Green, William A. Gordon, Alton A. Cheney, George C. Bryant, George A. Goss, and Albert S. Redway. After the stockholders' meeting the board of directors met and reelected the following officers: Mr. Farrel, chairman, board of directors; Mr. Pickering, president; Messrs. Hitchcock, Hoadley, and Kessler, vice presidents; Mr. Drew, treasurer; Laurie K. Blackman, assistant treasurer; Mr. Bryant, secretary; and Mr. Marvin, assistant secretary.

Archer Rubber Co., Milford, Mass. On March 1 five hundred employes formed the Archer Rubber Union Association, which will not be affiliated with any other labor organization. Officers elected are: president, Otis Stone; vice president, James E. Smith; secretary, Sadie Byron; treasurer, William Dalrymple.

Everlastic, Inc., with main plant at Chelsea, Mass., and branch at Pawtucket, R. I., has entered upon a program of rearrangement of machinery and general overhauling of plants and products. Considerable old machinery has been discarded, and new equipment acquired. The plant at Pawtucket, closed for some time, is being kept in readiness for quick operation as wanted fabrics are required. Present operations are carried on at the

(*Continued on page 74*)



Kelly-Springfield Tire Dealers in Boston Enroute to Cumberland

NEW JERSEY

EARLY spring finds operations of New Jersey rubber manufacturers fairly good; while some report business slackened somewhat the past few weeks. Sole and heel output has increased, and orders are now being filled for tennis footwear.

Jos. Stokes Rubber Co., Trenton, announces an improvement in business during the past few weeks with the plant running twenty-four hours a day.

Pocono Rubber Co., Trenton, satisfied with present conditions, expects business to continue normally through the spring.

Whitehead Bros. Rubber Co., Trenton, with business holding up very well, has two shifts working in some departments.

Murray Rubber Co., Trenton, purchased a short time ago by Max Kalter, of New York, N. Y., for $340,000, has ceased operations, and the machinery at the factory has been dismantled. The company has several thousand tires and tubes in the warehouses, which are expected to be disposed of shortly. Plans will be announced soon as to the disposition of the plant.

Tyson Bros., Woodbridge, is now being operated under a receivership since Vice Chancellor Malcolm Buchanan appointed Edward R. McGlynn and Thomas H. Tyson, a member of the firm, receivers. The concern manufactures a tire repair article, vulcanized vegetable oils, and other rubber products. It was set forth in the petition that the tire repair device caused a loss of more than $8,000 and that three of the directors refused to discontinue the manufacture of this item.

Pierce-Roberts Rubber Co., Trenton, is operating again with two shifts. Prospects for early summer are good.

D. A. Shirk, president and general manager, Rare Metal Products Co., Belleville, is enjoying a world cruise with his wife and two daughters, Anne and Marie Louise, also M. F. Tiernan, president, Wallace & Tiernan Co., of Belleville. Mr. Shirk's party sailed from New York on the *Empress of Britain,* January 7 and expects to return about the middle of May. While in China, Mr. Shirk made his bi-annual visit with D. K. Wei, former Carnegie Institute classmate and long business contemporary, who conducts the selection of special grades of needle antimony that are required in some of the Rare Metal products. H. L. Williamson, secretary and purchasing agent, Rare Metal Products, had the interesting experience of answering his desk phone to conduct a very clear and novel three-minute radio-phone conversation with Mr. Shirk, who at the time was aboard ship sailing in the South China Sea.

Essex Reorganization

A federal court order presents plans for reorganizing Essex Rubber Co., Trenton. Operated since July, 1931, by Harold S. Maddock as equity receiver, the company, with its subsidiary, the Vulcan Recovery Co., has been placed in the hands of Mr. Maddock and Joseph F. O'Shaughnessy, Essex president, as temporary trustees. The order to show cause why they should not be made permanent trustees and why the plan for reorganization submitted by the stockholders should not be approved was issued by Judge Forman in the United States District Court. It is returnable April 3 when a public hearing will be held in the federal court. The plan is predicated upon continuation of the business at its present location and with present staff of 435 employes. It will be financed through a loan already approved by the Reconstruction Finance Corp. To become effective under the federal statute the reorganization must be desired by creditors holding at least two-thirds of the total amount of indebtedness.

Two options are offered creditors in this plan. Under one debts would be settled by a cash payment of 40%. The second calls for a cash payment of 30% and 40% more in notes payable in 1945.

The total net assets of the company as of October 31, 1935, were $955,000; liabilities, $402,580. No dividends have been paid since January 1, 1929, and none would be until notes issued creditors under the reorganization option have been retired.

The business, established in Trenton in 1907, was incorporated three years later. It earned profits regularly until 1928, when drastic reductions in rubber prices were said to have caused heavy losses.

The property owned includes the plant of the Irwin Mfg. Co., adjoining the Essex plant, taken over in 1930 in satisfaction of advances made by the rubber concern.

Essex manufactures rubber heels and soles, other soft molded rubber products, and mechanical rubber specialties. Its subsidiary reclaims waste rubber for use by the parent organization.

Essex reports increased production in rubber soles and heels with the approach of moderate weather. Improvement in its other departments and good spring prospects also are noted.

Lambertville Rubber Co., Lambertville, operating with two shifts, is busy principally in the tennis footwear department. The demand for heavy footwear is also very good, and the company has enough orders on hand to keep the plant going for some time. More than 400 workers are now employed at the factory.

LEGAL

Adjudicated Patents

(C. C. A. Ohio.) Sloper patent, No. 1,372,567, for method of manufacturing the covers of pneumatic tires, claims 1 to 4 *Held* invalid, claims 2, 3, and 4 *Held* not infringed. Firestone Tire & Rubber Co. v. U. S. Rubber Co., 79 F. (2d) 948.

(C. C. A. Ohio.) Hopkinson patent, No. 1,374,505, for method of making motor-vehicle tires, claims 2, 9, and 15 *Held* not infringed, claims 16, 18, 23, and 27 *Held* invalid. *Id.*

(C. C. A. Ohio.) Gammeter patent, No. 1,480,719, for method and apparatus for making or manipulating tires, claims 1, 2, 18, and 19 *Held* not infringed, claim 17 *Held* invalid. *Id.*

(C. C. A. Ohio.) Sloper patent, No. 1,487,033, for apparatus for making the covers of pneumatic tires, claims 1, 2, 3, 4, 6, 7, 8, and 14 *Held* not infringed, claims 1 to 4 *Held* invalid. *Id.*

(C. C. A. Ohio.) Abbott patent, No. 1,507,563, for method and apparatus for manufacturing tire casings, claims 11, 23, and 31 *Held* valid and infringed. *Id.*

(C. C. A. Ohio.) Lough patent, No. 1,607,266, for rubberized fabric and its method of manufacture, claim 3 *Held* invalid. *Id.*

(C. C. A. Ohio.) Hopkinson reissue patent, No. 17,618, for manufacture of tire casings, claims 13, 14, 15, 16, 17, 18, 19, 21, 24, and 25 *Held* invalid. *Id.*

Patent Suits

Re. 16,542 (of 1,588,668), W. L. Fairchild, Vulcanizing apparatus, D. C., N. D. Ohio, E. Div., Doc. 3,110, Twemo Corp. et al. v. The Goodyear Tire & Rubber Co. Claims 22 and 24 *Held* valid, but not infringed; claims 30, 31, 32, and 33 *Held* invalid December 30, 1935.

Theodore S. Cart, president of the Atlantic Products Corp., Trenton, is on a lengthy cruise to Panama and California.

Mercer Rubber Co., Hamilton Square, reports business dropped off recently.

Near-Para Rubber Co., Trenton, finds business good. President Benjamin M. Rosenthal, who had been ill for some time, has regained his health following a lengthy stay in Florida.

Luzerne Rubber Co., Trenton, finds business fairly good, with a better demand for hard rubber products. Secretary-Treasurer C. Dudley Wilson is erecting a handsome summer home along the ocean front at Beach Haven, N. J.

James P. Flynn, factory manager of the Puritan Rubber Co. and of American Tile & Rubber Co., both of Trenton, was on a business trip to Washington and nearby southern states. The firms are running twenty-four hours a day in some departments and sixteen hours in others.

MIDWEST

IN THE Midwest, as with the rest of the country, figures on building construction continued to mount, resulting in increased demand for all types of building materials. Automobile sales, likewise, showed substantial improvement over recent weeks; while optimism in the agricultural sections continued to spread.

Automobile production continues to increase, with major plants on regular schedules. Demand for automobiles this year should be even greater than in 1935 and may reach 5,000,000 cars and trucks, Robert C. Graham, executive vice president of the Graham-Paige Motors Corporation, recently declared. Output in this country was 4,150,000 units last year and 2,800,000 in 1934.

In the St. Louis district in general the large manufactories are on 65% schedules. Small plants are marking time, and but few have speeded up in the last week. Shoe factories are on a good basis, considering the season.

New Process Rubber Co., Plymouth, Mich., is now merged with the Swedish Crucible Steel Co. and is addressed as Swedish Crucible Steel Co., Bonalite Division, 8561 Butler Ave., Detroit, Mich.

H. C. Hogan, Omaha, Neb., representative of the Hewitt Rubber Corp., Buffalo, N. Y., recently discussed synthetic and natural rubbers before the local Engineers' Club. H. S. Jennings, of the John Day Rubber & Supply Co., 1213 Harney St., Omaha, presided at the meeting.

The Safety Patrol of the Benton Public School, St. Louis, Mo., has been outfitted by the school's Parents-Teachers' Association with white rubber raincoats and hats in emulation of the attire worn by traffic policemen on stormy days. Among the many approving the high visibility of the costume as an aid in decreasing traffic accidents is F. E. Warren, representative of the United States Rubber Co., which manufactured the coats and caps.

Servus Rubber Co., Rock Island, Ill., at its annual meeting March 10 through its stockholders reelected the following directors for the ensuing year: Carl A. Hallgren, John W. Hauberg, John G. Huntoon, Walter A. Rosenfield, M. E. Strieter, Ardo W. Mitchell, M. S. Heagy, L. B. Icely, and T. G. Lee. Then the board renamed company officers: president, Mr. Hallgren; executive vice president, C. E. Little; vice president, Mr. Hauberg; secretary, Mr. Rosenfield; treasurer, Mr. Huntoon; assistant secretary-treasurer, A. W. Wurbs. The firm, which manufactures footwear, has, according to President Hallgren, employed constantly nine hundred workers, the normal number, since September 1.

Tucker's Fish-N-Float

Fish-N-Float

This device, Fish-N-Float, is something new for the fisherman when engaged in either fly or bait casting sport. The article is made of heavy olive drab canvas in ring form to encase an inner tube retained in place by an all around zipper or lacing. Attached to one side of the casing is a canvas seat provided with openings to accommodate the legs of the wearer. Straps are also attached to permit carrying the article conveniently on the shoulders when it is not worn. The device weighs only four pounds; yet it is as good as a boat to support a man of ordinary size in water beyond his depth, and it is much more convenient to carry than a boat. Special paddles are made to attach to the feet to aid in propelling. They allow moving about easily, noiselessly, and accurately in any direction. Tucker Duck & Rubber Co.

Chicago Group

The Chicago Group, Rubber Division, A. C. S., will hold its next meeting May 1 at the Sherman Hotel. Captain Kuhn, Chemical Warfare Service, will give a paper on "Rubber in Chemical Warfare," and J. C. Patrick, Ph.D., director of research, Thiokol Corp., Yardville, N. J., will talk on "Thiokol Development." Dinner tickets can be secured only by those previously arranging for reservations, according to B. W. Lewis, secretary, who may be addressed in care Wishnick-Tumpeer, Inc., 365 East Illinois St., Chicago, Ill.

The Pioneer Asphalt Co., Chicago, Ill., has announced the expansion of its plant at Lawrenceville, Ill., to take care of steadily increasing demands for the various items in its line of asphalt products. Both new construction to provide for increased tonnage requirements and considerable rehabilitation of present buildings and equipment were undertaken during the past winter to prepare for the anticipated increase in demand for asphalt products during the late spring and summer months. The Pioneer Asphalt Co. is owned and operated by Wishnick-Tumpeer, Inc., located at 295 Madison Ave., New York, N. Y.

Monsanto Chemical Co., St. Louis, Mo., through President Edgar M. Queeny, announced on March 2 the acquisition of Thomas & Hochwalt Laboratories, Dayton, O., and its subsidiary, Dayton Synthetic Chemicals, Inc. Monsanto thus acquires the only outstanding minority interest in its controlled subsidiary, Monsanto Petroleum Chemicals, Inc. The latter company, in the research and development stage, has conducted its research work in the above laboratories. Mr. Queeny further stated this acquisition augments the Monsanto research department with a highly trained staff with varied experience in many different industries and that it is planned to carry on in these laboratories exploratory and application research not directly connected with present manufacturing activities, which can be conducted advantageously apart from the manufacturing units of Monsanto. The laboratories will be known as the Thomas & Hochwalt Laboratories Division of Monsanto Chemical Co. and will continue under the direction of Dr. Charles A. Thomas and Dr. Carroll A. Hochwalt. Arrangements have been made for the gradual discontinuance of the research Thomas & Hochwalt Laboratories have been doing for other companies and the transfer of their sole attention to Monsanto problems.

Monsanto, following its recent liquidation of several of its subsidiaries, including Rubber Service Laboratories Co., Akron, announces the latter will be reorganized as a division of the company and addressed as follows: Monsanto Chemical Co. (Rubber Service Laboratories Division).

Fisk Rubber Corp., Chicopee Falls, Mass., recently opened a wholesale branch at Sixth Ave. and Crocker St., Des Moines, Iowa, to cover the state except for extreme western counties and to distribute Fisk and Federal automobile and truck tires, bicycle tires, automobile and tire accessories, and tire repair materials to dealers in this territory. E. H. Paradies, assistant general auditor, and E. F. Staffelbach, district representative, both of Chicopee Falls, attended the opening, when the former announced that L. B. Van Hoesen, manager of the Fisk branch in Denver, Colo., had been transferred to Des Moines as zone manager and that L. L. Lillibridge, assistant office manager of the company's Omaha, Neb., branch, has been named office manager of the new wholesale office.

The International Smelting & Refining Co., a subsidiary of the Anaconda Copper Mining Co., recently resumed the operation of its lead-zinc flotation mill at Salt Lake City, Utah, which has been idle since 1931, according to reports from that city.

PACIFIC COAST

F. S. Carpenter

Factory Manager

An interesting and varied career spent with the United States Rubber Co. has been the lot of Frederich Scarborough Carpenter, factory manager, Samson Tire & Rubber Corp. Division of U. S. Rubber at Los Angeles, Calif. Born in Wethersfield, Conn., March 1, 1891, he attended elementary and high schools and Worcester Polytechnic Institute, graduating in 1913 with a B.S. degree after having majored in electrical engineering. In June, 1913, he went to work for the rubber company in the engineering department at 1790 Broadway, New York, N. Y., where he was assistant to the vice president in charge of development and engineering.

Then when the United States entered the World War, Mr. Carpenter enlisted and was a captain in the air service.

Reembracing civilian life, January 1, 1919, he became chief engineer of the Hartford Rubber Works, where he remained until 1927 when he was sent to U. S. Rubber's plantations in Sumatra on a special engineering assignment. He returned January 1, 1929, as chief engineer of the company's Detroit plant. Two years later he was appointed to his present position, factory manager of the Samson plant.

Mr. Carpenter is a member of the Los Angeles University and Annandale Golf clubs.

His home is at 574 Bellefontaine St., Pasadena, Calif.

Lee Tire & Rubber Co., Conshohocken, Pa., recently promoted H. L. Roth, with the company twelve years, Pacific Coast district manager to succeed the late Duncan Pate, who had served as Pacific Coast district manager a dozen years.

CANADA

A. G. Partridge

Canadian Goodyear Head

Albert Gerry Partridge, who succeeded C. H. Carlisle as president of the Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., when the latter resigned February 10 because of ill health, has a long and enviable record with the rubber industry, dating back to 1899.

Born in Jamestown, N. Y., August 25, 1880, Mr. Partridge was educated in the schools of his native town. In 1899 he joined the Diamond Rubber Co., Akron, O., as clerk in its New York, N. Y., office, subsequently serving as office manager, salesman, and branch manager. Then in 1905 he obtained employment with the Firestone Tire & Rubber Co., Akron, holding consecutively until 1921 the following positions: department manager, assistant sales manager, general sales manager, and vice president in charge of sales and advertising. From 1922 to 1924 he was manager of the pneumatic tire department of The B. F. Goodrich Co., Akron. Next followed work in the real estate business.

But on October 6, 1926, Mr. Partridge reentered the rubber industry with the Goodyear Tire & Rubber Co., Akron. On July 1, 1927, he became manager of the company's western division. His successful efforts there were rewarded with another promotion as on November 1, 1928, he was named managing director of the Goodyear plant in Wolverhampton, England, where he remained until his recent new appointment.

Among organizations in which Mr. Partridge has held membership are the Masons (Scottish Rite, Commandery, and Shrine), Akron City, University, and Portage Country clubs, and the Institution of the Rubber Industry.

Industrial Accident Prevention Associations, 600 Bay St., Toronto 2, Canada, will hold its annual safety convention and exhibit April 22 and 23 at Royal York Hotel, Toronto. R. B. Morley is general manager of the I. A. P. A.

Canadian crude rubber imports totaled 60,188,210 pounds, value, $6,955,148, in 1935, compared with 63,701,489 pounds, value, $7,553,651, in 1934. Canadian imports of rubber, by countries of origin, show a greater amount of rubber imported direct from rubber producing countries in 1935 than in 1934, causing a great shrinkage in Canadian imports of rubber from the United States in 1935.

W. A. Eden (*right*), President, Dominion Rubber Co., Ltd., Montreal, Canada, Receiving from Lt. Col. Arthur Gaboury the Award of "Excellence" of the Quebec Association for the Prevention of Industrial Accidents for Operating 1,148,400 Man Hours during 1935, without a Lost Time Accident

Rubber Industry in Europe

GREAT BRITAIN

Rubber for Quarry Work

At a recent meeting of the Institution of the Rubber Industry in London, H. C. Young discussed the wide possibilities of rubber in the quarrying industry. Equipment for such work is subject to unusual wear from abrasion, corrosion, cutting, etc., he stated and pointed out how the use of suitably compounded rubber at innumerable points could help the quarrying industry economically, because the superior resistance of rubber to the destructive influences rendered rubber parts cheaper than corresponding parts of metal or even other materials.

Thus the back plates of excavators could be covered with rubber; it could be incorporated in the shoes and in parts of the bucket especially subjected to wear. Mr. Young mentioned that in South Africa, at mines near Johannesburg, skips were either completely covered with rubber or the bottoms were so protected. Again in Canada rubber-covered four-wheel trucks, imported from England, were successfully used for transporting stone. Rubber could also very well be applied to tipping trucks, conveyers, head-rope gear, and drag lines.

Jaw-crushers used in the quarrying industry have to be constantly repaired, the cost ranging from 4½d. to 10d. per ton of product. The use of rubber here would help to effect economies; rubber would also be serviceable on the wheels driving or guiding the rotating screens, and ball and rod mills. He mentioned the success of rubber-covered screens introduced into a pit in Lancashire in 1927. The vibrational movement of vibrating screens could be prevented by covering the junction where the wires crossed, with rubber, thus prolonging the life of the screens. Rubber-lined pumps used in recovering fines from the sludge give much longer service than other types usually employed. Ball-mill linings of rubber several inches thick outwear metal linings and are less costly.

Elevator buckets should be made of rubber, Mr. Young suggested; in fact he had heard of such buckets twenty by twelve inches, which appeared very satisfactory. Those parts of air-separators where velocity is very high and there is considerable abrasion of metal should be covered with rubber, as should vibrating tables used for concentrating metals.

In short there was an endless number of places in all types of quarrying equipment at which rubber could be advantageously used: in bearings, springs, chutes, conveyers, for lining mills and bins, covering wheels and pumps, impellers, valves, etc. As millions of tons of stone are quarried annually, the potential demand for rubber should be enormous.

Rubber men should read the technical articles relating to quarrying and quarrymen should read papers dealing with rubber so that the two industries might become acquainted with and understand each other's problems.

New Rubber Exchange

A large number of persons prominent in and outside the rubber industry was present when Walter Runciman, president of the Board of Trade, opened the new Rubber Exchange in Plantation House, Fenchurch St., London, February 7. Mr. Runciman was welcomed by H. D. Cowan, chairman of the Rubber Trade Association of London and of the London Rubber Exchange Co., who presided. He pointed out that though the rubber trade was very old, the association was comparatively new, having been constituted in 1913. For many years there had been no central rubber exchange, business being conducted in the offices of merchants and brokers while the only open market had been the street. It was not until 1923 that the first Exchange Room had been opened and that had been occupied until now. The Rubber Trade Association was unique among commodity associations in London in that it comprised every section of the market interests—dealers, brokers, producers—and herein lay the strength of the London rubber trade. Mr. Cowan then read cablegrams of congratulation from the members of the New York Commodity Exchange, the Rubber Trade Association of New York, and the Rubber Association of Singapore.

Mr. Runciman congratulated the members upon the opening of their very beautiful building. Discussing the growth and development of the rubber industry, he spoke on the need of wholesome speculation. Sooner or later, he said, the trade was bound to provide for forward transactions, for speculating and hedging. There was no doubt they could not have provided for the markets as a whole if they had never provided for proper speculation. There had some little time ago been a surfeit of speculation in certain commodities, and much money had been lost. This loss could have been avoided if settling days had been more frequent. Frequent settlements were the essence of sound business, and the Rubber Trade Association rendered this possible.

H. Eric Miller proposed a vote of thanks to Mr. Runciman and, referring to the latter's statement on speculation, stressed the unwholesome effect of excessive speculation. Sir Herbert Wright, was another speaker.

British Industries Fair

This year the British Industries Fair was held simultaneously at Olympia, White City, and Birmingham and was open from February 17 to 28. As usual, the rubber industry was adequately represented. Among the comparatively few novelties seen was Dunlop's new "Cosimax" hot water bottles with a plush rubber-proofed surface said to retain heat better than plain rubber; non-slipping blotting pads, and rubber toy buckets with handles molded in one with the bucket shown by the Empire Rubber Co., Ltd. The novelty balloons of the Grovewell Rubber Co. included "Peter Penguin," which always lands on its cardboard feet when dropped after inflation, and the "Flying Flea" airship, which will travel 150 feet. Murray & Ramsden, Ltd., showed "Mickey Mouse," said to be very popular here. The firm has obtained exclusive license to produce these balls in England.

A new toy is an all-rubber self-locking building brick. "Minnibrix" is the name, and they are made by the Premo Rubber Co., Ltd., of red and white rubber. Each brick has button-like projections at one side and corresponding depressions on the other so that a structure can be moved without falling apart. The bricks come in standard sizes and sets range in price from 5s. to £3.3s., but separate bricks may also be had, the price for half or angle bricks being three for 1d. and for whole bricks, ½d. each.

Imperial Chemical Industries (Rexine), Ltd. featured the new Monastral Fast Blue B.S., now called "7 Star Blue." The pigment is already widely used in various industries, also in the rubber industry.

Bata just established a branch to manufacture footwear, rubber goods, woven and knit goods, in Groningen, Netherlands, under the name of N. V. Nederlandsche Schoen-en Lederfabrieken Bata Best.

GERMANY

Imports and Exports

Considering the restrictions under which the rubber industry in Germany now operates, the fact that 1935 imports of crude rubber increased over those of 1934 and even more as compared with 1933, is somewhat of a surprise. Crude rubber imports in 1935 came to 651,352 quintals, value 44,327,000 marks, against 636,612 quintals, value 40,908,000 marks. Total imports of manufactured goods were 53,365 quintals, value 4,175,000 marks, against 33,262 quintals, value 5,764,000 marks, the year before. The increased quantity of imported goods at decreased value is explained by the fact that under imports of fabric goods combined with rubber thread (38,687 against 13,161 quintals) was included in 1935 a large amount of worn tire carcasses. But for this, the 1935 imports would have shown a considerable decline in quantity, especially as the figures also include a fairly large amount of returned German goods. Thus of 1935 footwear imports at 15,415 pairs, against 19,769 in 1934, 10,123 pairs were returned goods. Again, practically all of the cycle tires (16,154 against 14,573) consisted of returned goods.

Most other items showed declines even when returned goods are left out of consideration. Thus uncovered thread was only 462 quintals against 1,699 quintals; cycle tubes, 327 against 7,028 units; automobile tires, 18,625 against 25,644; belting, 128 quintals against 421; other soft rubber goods, 1,921 against 3,648 quintals; hard rubber and goods thereof, 1,550 quintals against 1,647 quintals.

Total exports of manufactured goods were 143,740 quintals, value 39,818,000 marks, against 133,645 quintals, value 41,767,000 marks. The increase in quantity and decline in value in the above figures are to be noted. In an examination of the individual items, the sharp decline in footwear exports (334,387 against 545,508 pairs) and the equally marked spurt in those of cycle tires (933,148 against 432,793) and cycle tubes (760,814 against 357,870) are conspicuous. Automobile tire exports rose from 183,897 to 188,001 units, but the value fell from 6,514,000 to 5,904,000 marks; automobile tubes were 107,812 against 112,883 units. Belting exports rose from 1,546 to 1,898 quintals; packing from 1,184 to 1,260 quintals; rubber combined with fabric, from 12,656 to 14,775 quintals; but other soft rubber goods declined from 57,124 to 55,994 quintals.

International Auto Show

One of the features of the International Automobile Show recently held in Berlin was the exhibit of articles made from Buna, the new synthetic rubber perfected by the I. G. Farbenindustrie. The name Buna is derived from butadien-natrium caoutchouc (sodium butadiene). The basic ingredients are lime and coal, converted to calcium carbide from which in turn acetylene is obtained, and after further chemical processes, butadiene. Buna results after polymerization of the latter. This description indicates similarity to "DuPrene"[1] and the Russian Sovprene.

Buna is claimed resistant to oil and benzene and to have better resistance to abrasion than natural rubber. Hard rubber from Buna is said to resist chemical action better than natural rubber. At the exhibition, tires of Buna made by the leading German tire manufacturers were shown, and the superior abrasive qualities demonstrated. Two Metzeler tires were displayed, each of which had run 25,000 km.; one contained 26% of Buna, the other 100% natural rubber. The former showed only 74% of wear as compared with the latter. Brake hose and heating tubes made with Buna have been tested by the German State Railway Co. Other hose, packing, and printing rolls are also being made with this new synthetic rubber.

Of the usual rubber tires exhibited, the deeply recessed sidewall patterns attracted attention; several tires also showed the special non-skid treads with edges cut up into thin, waved layers, which, however, are actually molded into this shape. The idea seems to have been taken from the deep lateral grooves cut by tire retreaders, first developed in France where similar tread designs were shown over a year ago.

Other exhibits illustrated the progress made in the application of rubber to bearings, springs, etc., of automobiles. The Getefo concern, for instance, has improved its bonding process so that now rubber can be perfectly united to any material—aluminum, fiber, bakelite, wood, glass, porcelain.

[1] Trade mark registered.

EUROPEAN NOTES

The Dansk-og Gummifabrik A.S., Copenhagen, Denmark, booked net profits of 1,260,000 kroner against 1,070,000 kroner and paid a dividend of 15% against 12% in 1934 and 5% in 1933. The concern produces chiefly footwear and cycle tires.

A subsidiary of the Norske Kalosje-og Gummivarefabrik A.S. has been established at Mjondalen, Norway. The new concern, known as the Mjondalen Gummivarefabrik, will be directed by Consul General P. M. Rowde. In a review of the year 1935 Mr. Rowde states it was a very favorable one for the Norwegian rubber industry, sales and production of footwear constituting a record. The only drawback seems to have been the large imports of inferior footwear from Eastern Asia. The A. S. Askim Gummivarefabrik, Oslo, he says, employed on an average of 1,200 persons during the year; its Mjondalen works, 400, and the recently opened A. S. Norske Gummiprodukter of Stavanger, 150 persons. The Askim works, it may be added, has taken up the manufacture of tires and tubes and now produces 100 covers a day.

Comertex, Compagnie Commercielle et Industrielle du Latex, is the name of a new firm recently established at Paris with a capital of 25,000 francs. The company represents the Kautschuk Gesellschaft of Frankfurt a.M., Germany.

Fournier, Ostertag & Le Boulanger report net profits of 618,636 francs for the year ending June 30, 1935. A dividend of 6 francs per share was distributed.

Judging from official statistics, Sweden's business in rubber goods declined in many lines during 1935. Crude rubber imports were only 4,956,907 kilos, against 7,512,761 kilos; imports of soles and heels fell from 217,218 to 166,749 kilos; inner tubes for motor vehicles and bicycles, from 174,304 to 117,850 kilos; other cycle parts from 116,370 to 56,845 kilos; surgical goods from 253,695 to 252,267 kilos; footwear from 130,603 to 58,833 kilos; and rubber-soled shoes from 149,954 to 122,716 kilos. But belting imports rose from 333,606 to 387,223 kilos; automobile tires from 1,774,229 to 2,071,846 kilos; and other automobile parts from 231,726 to 253,466 kilos. Exports of technical rubber declined from 107,330 to 80,122 kilos; parts for automobiles and motor cycles including tires, from 48,978 to 48,619 kilos. Footwear exports showed an especially sharp drop, rubber shoes having been 398,918 kilos against 514,748 kilos and rubber-soled shoes 78,436 against 101,130 kilos. However comparative figures for exports in January, 1935, and 1936, show that there is now a decided upward tendency in the footwear export business.

Under a ministerial decree, effective January 29, carbon black may enter Belgium duty free provided it is imported exclusively for industrial use in the manufacture of certain products. The duty-exempt manufacturing comprises rubber and ebonite, paints, enamels and varnishes, wax, polish and other cleansing products, printing inks, wallpaper, and manufacturers of synthetic resins.

Rubber Industry in Far East

NETHERLAND INDIA

Rubber Tired Ox-Carts

Recently the manager of the Cassava Estate & Tapioca Factory, Krebet, of South Malang, T. Tacoma, gave a very successful demonstration of the advantages of pneumatic tires for ox-carts. It is claimed that whereas the usual narrow iron-shod wheels of ox-carts cut up the roads and completely ruined them in a short time, the wide pneumatic tires designed for these carts exert a roller-like action on the surface, actually making it more compact. In the demonstration the truth of this statement appears to have been borne out. Mr. Tacoma first had one of the usual ox-carts with large, iron-shod wheels driven through a wet maize field. The cart, drawn by two oxen, carried a one-ton load; the cart soon stuck in the wet earth and required the assistance of a second team to extricate it. A second cart, also drawn by two oxen, but equipped with Dunlop pneumatic tires, was then led out and, though it had a two-ton load, negotiated the field after a few delays. Other ox-carts similarly equipped went over the same path, and by the time a fourth rubber-tired cart started out the road surface was such that the cart traveled over it with much greater ease than did the first pneumatic-tired cart. On the village road, where, of course, conditions were much more favorable, the rubber tires proved a distinct success and evidently impressed the onlookers. Such tires have already been introduced on one rubber estate in Java, and it is expected that before long most estates and factories will be using pneumatic tires on ox-carts.

New Concentrated Latex

A new method of obtaining stable, purified, and concentrated rubber latex is credited to the N. V. Rubber Cultuur Mij. Amsterdam. Coagulation causes most of the pigment in latex to pass over into the coagulum, a fact that has been taken advantage of in fractional coagulation to obtain light colored latex for special purposes. It is customary to add just enough coagulant to the latex to cause flocculation, a process assisted by agitation of the mass. After a few hours a lumpy mass forms at the top, which contains most of the pigment and the albumen; when this is removed, a much lighter-colored latex is left behind. Usually more acid is then added to coagulate the rest of the latex. However it has been found that this remaining white latex, hitherto regarded as an intermediate phase in the coagulation of the rubber, has special properties which render it valuable in itself, as a new product with new possibilities. Not only is it lighter in color (almost white in fact) and purer than the original latex, but it has also a higher rubber content.

The concern in question has worked out a process to make of it a stable, marketable article. Precoagulation, therefore, is carried out with a solution of calcium chloride instead of acid (traces of acid left behind in the residual latex might cause undesired partial coagulation) and usually takes place within half an hour, undiluted latex being used. After the first fraction has been removed, a stable latex with a rubber content averaging 41.9%, against an average of 38.2% for the original latex, is obtained, that is there is an average increase in the rubber content of 3.7%. When the latex is to be shipped or stored, ammonia or some other preservative is added as usual.

Notes

A Japanese company is said to be planning a factory to manufacture rubber goods, except tires, at Cheribon.

The special export duty on native rubber, fixed at 29 cents per kilo on November 11, 1935, remained unchanged until February 12 when it was increased to 32 cents; on February 20 it was again raised to 33 guilder cents per kilo.

Preliminary statistics put the exports of estate rubber from Netherland India at 147,142 tons, against a permissible quota of 159,953 tons, so that shipments for 1935 were about 12,800 tons under quota. In 1934 they were 6,901 tons below quota. Native exports, on the other hand, were 144,716 tons, against a quota of 114,367 tons, less 8,450 tons excess in 1934, or 105,917 tons. The excess native exports in 1935 therefore totaled 38,799 tons. From this, however, must be taken the 20,000 tons bought up by the government, leaving an excess of 18,799 tons.

The registration of native rubber gardens in East Coast Sumatra, Djambi, Palembang, West Borneo, and South East Borneo has now been completed. It is expected to obtain data from 500,000 native producers.

Judging from figures published by the Central Bureau of Statistics, the high export duty practically stopped the shipment of wet rubber in December, 1935. Of the three districts which are the chief producers of this type of rubber, Palembang shipped none at all in that month, Djambi sent only ten tons, and Bengkalis not quite six tons of wet rubber. The total native exports in December, it will be remembered, came to the exceptionally low figure of 2,956 tons.

White Sole Crepe

The A.V.R.O.S. has developed a method (Netherlands patent No. 68,797, December 16, 1935) for producing white sole crepe in which the desired whiteness is obtained by adding a pigment to the latex before coagulation. Attempts in this direction have hitherto failed, but it is claimed that the new process yields a white, homogeneous product with all the advantages of ordinary uncolored sole crepe. Latex is diluted to 20%, and to five liters is added five grams of bisulphite of soda in the usual way. Then eight grams of dry titanium white and four grams of casein (the minimum proportion recommended) are mixed with ninety grams of water, and the whole allowed to swell for fifteen minutes. Next 1.5 grams of waterglass are added, and the entire mix thoroughly stirred until a homogeneous solution is obtained. More water may be added if the viscosity of the solution is too high. The mixture is passed through a sixty-mesh sieve into the latex and thoroughly stirred into it, after which coagulation is induced by the addition of 1.25 cc. of strong formic acid. In about three hours coagulation will have been completed when the coagulum is worked up into crepe, dried, and finished as sole crepe in the customary manner. The white crepe is also suitable for other articles, bandages for instance.

PACIFIC ISLANDS

Western Samoa had an area of 1,750 acres under *Hevea* some years ago, 1,500 acres owned by companies and 250 acres by individuals. In 1927 exports were 158 tons; in 1928, 167 tons. These areas have been abandoned for some years.

Fiji is the southernmost point of *Hevea* plantings, so far as known. Exports were 104 tons in 1926 and 99 in 1927; there were none from 1931 to 1933 inclusive. There are probably 750 acres of abandoned *Hevea* in Fiji.

Hainan was the scene of some rubber planting years ago, and this is about the northernmost point of known rubber plantings in the Pacific. The areas are recently productive, but their extent is not definitely known.

MALAYA

Coating for Latex Drums

More than a year ago Edgar Rhodes and K. C. Sekar, of the Rubber Research Institute of Malaya, investigated the causes of discoloration of latex and showed it due to the iron drum in which latex is usually shipped. The next problem was to discover a satisfactory drum-coating medium which would prevent discolorations or reduce it to a minimum. The December, 1935, issue of the *Journal of the Rubber Research Institute of Malaya* describes their tests and results.

A number of proprietary brands of paints and protective solutions were tested, and the only satisfactory material found was one with a base of chlorinated rubber. A chlorinated naphthalene preparation, a soluble bakelite preparation, and a preparation with a base of a rubber derivative also proved promising. Unfortunately these preparations were too expensive besides in most cases being too complicated to prepare and apply.

The investigators now attempted to produce a film containing a chemical substance which would react with latex-sulphur bodies to produce a white sulphide instead of the black sulphide of iron. After various tests a medium consisting of latex and zinc oxide was developed. Early in 1935, J. S. Laird, manager of Jemima Estate, made large-scale trial shipments of several thousand gallons of latex in drums filmed with the latex-zinc-oxide medium. The president of the Heveatex Corp., Melrose, Mass., J. B. Crockett, accepted these trial shipments and further cooperated by reporting fully on the latex from these consignments. From the report it appears that when the latex-zinc-oxide filming medium is carefully applied, the latex reaches its destination in a good white condition while the film itself on the whole adheres well to the metal. The film has one disadvantage—it tends to reduce the stability of the latex. But the authors were advised that if a buyer was previously informed that drums had been filmed, he could, in most cases, correct the reduction in stability without much difficulty. Since the film may have a still more marked effect on the stability of centrifugally concentrated latex, producers of this type of latex are advised to use the film with caution.

Aging of Sheet

In recent years the need to cut costs to a minimum has led managers to do their utmost, among other things, to speed up the drying process in making sheet. As a result, many improvements in smoke houses and driers have been introduced so that whereas the normal drying period formerly was ten days and more, this has been reduced so that a period of four days is now quite common in Malaya; while some very up-to-date estates can even dry their sheet in two days.

But manufacturers complained about the poor aging properties and the variability of plasticity of sheet rubber; consequently the effect of drying conditions on the properties of rubber is now under investigations. J. D. Hastings, who undertook this work, reports in the Institute's *Journal* on the aging of sheet under different drying conditions. Batches of sheet prepared in identical manner up to the drying stage, but dried in hot air and smoke respectively, were examined, and it was found that the aging properties of the hot-air-dried sheet was invariably inferior to those of smoked sheet, except when prepared from very dilute latex. To what this difference is due cannot be explained until further tests, now in progress, have been completed and further information has been obtained on a number of points.

Creaming Latex

The December issue of the *Journal of the Rubber Research Institute of Malaya* also includes descriptions of two patents obtained by Edgar Rhodes and K. C. Sekar on creaming latex. In the first (B. P. 415,133) the creaming is effected by means of gum tragacanth with small quantities of alcohol added, which helps to accelerate creaming without affecting the quality of the creamed product. For some unknown reason many grades of gum tragacanth have poor creaming properties. Probably for this reason further experiments were carried out, and a process developed (B. P. 430,935) in which the creaming was brought about with carob seed gum, or, as it is usually called in Malaya, Tragon A seed gum. In this process the pH value of normal 35% latex is first increased by raising the ammonia content from 0.5% to 1.5% (calculated on the dry weight of the rubber), the purpose being to accelerate the creaming and to give a stable product. Then a freshly prepared 3% aqueous solution of carob seed gum is added. After forty-eight hours the latex separates into two layers, the upper containing about 55% of the original volume of latex and having a dry rubber content of 58.4%, and a lower layer consisting of a solution of the serum substances and some rubber. The concentrated cream contains about 0.94% ammonia, and despite its high dry rubber content has no tendency to recream on standing, but remains homogeneous and stable.

Freshly prepared gum solutions should always be used as the solutions are unstable and, when left, deteriorate as creaming agents.

(*Continued on page* 84)

INDO-CHINA

Latex Preservatives

Latex from trees on the red soils of Indo-China shows much greater acidity than that from trees on the grey soils of the country or than Malayan latex. This higher acidity frequently causes coagulation of the latex even before it can be brought to the factory so that a preservative must be added in the fields. The ideal preservative is, of course, ammonia. Unfortunately this is expensive, and its use adds unduly to production costs. Sulphite of soda would be the cheapest to use, but it is frequently necessary to use as much as ten kilos per ton of dry rubber and even more to obtain the desired results, and in such proportions sulphite of soda has a deteriorating effect on rubber.

The manager of the Société des Plantations des Terres Rouges set himself to solving the problem and after much experimenting hit upon a mixture of soda, paranitrophenol (PNP), and sulphite of soda, which, it seems, is effective and costs less than half as much as ammonia to use. PNP gives great stability and prevents the formation of mold on smoked sheet and dry crepe. It has the property of coloring acid latices yellow; while it gives alkaline latices a deeper tint tending to orange. When a coagulant is subsequently added, the latex becomes white again. Advantage is taken of this tendency to coloration to determine the correct strength of the solution and the right amount to be added to the latex in the field to correct the acidity. A solution consisting of 1.55 kilos of 99% NaoH, 1.25 kilos of commercial PNP, and 10 kilos or 98% sulphite of soda in 100 liters of water was found satisfactory. The dose recommended is 100 cc. for 10 liters of latex; this proportion may be increased as necessary, without harmful effect.

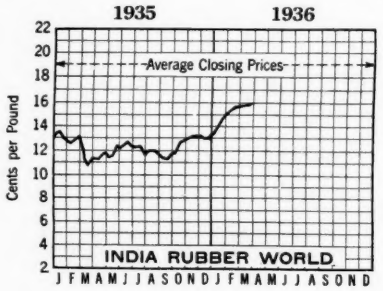
Notes

The Société Indochinoise de Plantations d'Heveas is the name of a new combine in which the Société des Plantations d'Anloc absorbs the Société Agricole de Suzannah and the Société Agricole et Industrielle de Ben Cui. The new company has also acquired the property of the Société Agricole du Song Ray, now known as Plantation Gallia. The general manager of the Société Indochinoise de Plantations d'Heveas is M. Birnie.

French Indo-China has reduced the export tax on liquid latex from 0.10 piaster to 0.04 piaster per 100 net kilos, and on concentrated latex from 0.10 piaster to 0.06 piaster per 100 net kilos; and for additional shipments involving fractions of 100 kilos, from 0.01 piaster per 10 kilos reduced to 0.01 piaster per 25 kilos.

Market Reviews

CRUDE RUBBER



New York Outside Market—Spot Ribbed Smoked Sheets

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

Futures	Feb. 1	Feb. 29	Mar. 7	Mar. 14	Mar. 21
Feb.	14.97	.....	.....	.....	.....
Mar.	15.04	15.58	15.89	15.97	16.03
Apr.	.....	15.64	15.93	16.00	16.04
June	15.23	15.74	16.02	16.08	16.08
July	.....	15.79	16.08	16.13	16.12
Sept.	15.42	15.91	16.17	16.23	16.22
Dec.	15.63	16.08	16.35	16.32	16.32
Jan.	15.70	16.13	16.40	16.36	16.35
Volume per week (tons)	15,560	7,640	8,000	5,520	5,040

THE above table shows the price trend of representative futures for approximately the last two months. The general upward trend which began last September has carried No. 1 smoked sheet prices from the 12¢ level to that exceeding 16¢.

Towering above all other factors influencing the activity of the futures market is the Goodyear strike, in effect since mid-February to March 23. This has restricted factory demand and limited speculative trading so that the total exchange transactions have been measurably lower than usual. In spite of this disturbing element, however, the market in general has remained firm, and the price structure maintained, largely owing to the continued effectiveness of the restriction scheme and the very favorable business outlook. It has happened that the first several days of each of the past few weeks the price of rubber generally has declined in an orderly manner only to be suddenly recovered by substantial increases the last days, to close the week with a gain over the previous week's closing prices. The I.R.R.C. met February 24, but acted only on routine matters which had nothing to do with changing the quota situation. Despite the reduced consumption of rubber in the United States during February, mainly because of the situation in Akron, the crude rubber stocks in this country continued to decline, being 273,284 long tons February 29 as against 276,372 at the end of January and 339,335 on February 28, 1935.

News of the settlement of the Goodyear strike in Akron was received by the crude rubber trade Monday, March 23, with much interest. Factory demand, however, did not materialize as was expected, or was the trading in futures activated as a result. On the other hand the market receded somewhat after Monday, causing a fall in prices of 12 to 15 points at the close March 26, as against March 21.

New York Outside Market

The week-end closing prices for No. 1 smoked sheet spots since late in January follow: January 25, 15¢; February 1, 15 1/16¢; February 8, 15 7/16¢; February 15, 15¾¢; February 22, 15 13/16¢; February 29, 15 5/8¢; March 7, 15 15/16¢; March 14, 16¢; and March 21, 16¢. Except on occasional days since the beginning of the Goodyear strike, factory demand has been very quiet or nil. Nevertheless the price of spot rubber has been very steady in the region of the 16¢ level. Downward fluctuations of the futures market had little and oftentimes no effect on the spot price. The increasing effectiveness of the rubber restriction scheme and the favorable demand conditions anticipated at the close of the long Goodyear strike are factors supplying bullish strength to the physical rubber market that render ineffective such ordinarily unfavorable statistics as the sharp decline of consumption in the United States during February of 36,746 long tons as against the record consumption of 48,506 long tons for the previous month and 14.9% below that of February, 1935. The above figures were released by The Rubber Manufacturers Association, Inc., which further reports that the domestic stock at the end of February was 273,284 long tons, 3,088 long tons less than on hand the end of January.

New York Quotations

New York outside market rubber quotations in cents per pound

Paras	Mar. 25, 1935	Feb. 26, 1936	Mar. 27, 1936
Upriver fine	9	16½	17
Upriver fine	*11⅜	*19	*20¾
Upriver coarse	6¾	12½	12½
Upriver coarse	*10	*15½	*17
Islands fine	8¾	17	17¾
Islands fine	*11	*19	*20¾
Acre, Bolivian fine	9¾	16½	17¼
Acre, Bolivian fine	*11¾	*19	*20¾
Beni, Bolivian	9¾	17	17¾
Madeira fine	9	16½	17
Caucho			
Upper ball	6¾	12½	12½
Upper ball	*10	*15½	*17
Lower ball	6½	12	12¼
Pontianak			
Bandjermasin	6	6½	7
Pressed block	10/11	12½	12
Sarawak	6	6½	7
Guayule			
Duro, washed and dried	12	12½	13
Ampar	13	13½	13½
Africans			
Rio Nuñez	12	15⅛	15⅛
Black Kassai	10	15⅛	15⅛
Prime Niger flake	25	25	25
Gutta Percha			
Gutta Siak	9½	11¾	11½
Gutta Soh	13	12¾	12¾
Red Macassar	1.25	1.20	2.00
Balata			
Block, Ciudad Bolivar	34	28	28
Manaos block	26	28	27
Surinam sheets	36	37	36
Amber	42	39	39

*Washed and dried crepe. Shipments from Brazil.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	February, 1936						March, 1936															
	24	25	26	27	28	29	2	3	4	5	6	7	9	10	11	12	13	14	16	17	18	19	20	21
No. 1 Ribbed Smoked Sheet	15 5/8	15 1/2	15 7/16	15 7/8	15 5/8	15 5/8	15 5/8	15 5/8	15 3/4	15 7/8	15 11/16	15 11/16	15 11/16	16	16	15 11/16	15 7/8	16	15 11/16	15 7/8	15 11/16	16	16	16
No. 2 Ribbed Sheet	15 5/16	15 7/16	15 3/8	15 1/2	15 5/8	15 5/8	15 5/8	15 5/8	15 11/16	15 11/16	15 7/8	15 7/8	15 3/4	15 11/16	15 11/16	15 7/8	15 3/4	15 11/16	15 11/16	15 7/8	15 3/4	15 11/16	15 11/16	15 11/16
No. 3 Ribbed Smoked Sheet	15 1/2	15 3/8	15 5/16	15 7/16	15 1/2	15 1/2	15 1/2	15 1/2	15 5/8	15 3/4	15 11/16	15 11/16	15 11/16	15 7/8	15 7/8	15 11/16	15 3/4	15 7/8	15 11/16	15 3/4	15 11/16	15 7/8	15 7/8	15 7/8
No. 4 Ribbed Smoked Sheet	15 7/16	15 5/16	15 1/4	15 3/8	15 5/16	15 7/16	15 7/16	15 5/16	15 5/16	15 11/16	15 3/4	15 3/4	15 5/8	15 11/16	15 11/16	15 3/4	15 11/16	15 11/16	15 3/4	15 11/16	15 5/8	15 11/16	15 11/16	15 11/16
No. 1 Thin Latex Crepe	16 1/16	15 11/16	15 7/8	16	16 1/16	16 1/16	16 1/16	16 1/16	16 1/16	16 1/16	16 3/16	16 3/16	16 1/4	16 1/16	16 3/16	16 1/16	16 1/4	16 3/16	16 1/4	16 1/16	16 1/8	16 1/16	16 1/16	16 1/16
No. 1 Thick Latex Crepe	15 11/16	15 11/16	15 3/4	15 7/8	15 11/16	15 11/16	15 11/16	15 11/16	16 1/16	16 1/16	16 1/4	16 1/4	16 1/8	16 1/16	16 1/16	16 1/16	16 1/16	16 1/4	16 1/8	16 1/16	16	16 1/16	16 1/16	16 1/16
No. 1 Brown Crepe	15 5/8	15 7/16	15 3/8	15 1/2	15 5/8	15 5/8	15 5/8	15 5/8	15 11/16	15 11/16	15 7/8	15 7/8	15 3/4	15 11/16	15 11/16	15 7/8	15 11/16	15 11/16	15 7/8	15 11/16	15 3/4	15 11/16	15 11/16	15 11/16
No. 2 Brown Crepe	15 1/2	15 3/8	15 5/16	15 7/16	15 1/2	15 1/2	15 1/2	15 1/2	15 5/8	15 3/4	15 11/16	15 11/16	15 11/16	15 7/8	15 7/8	15 11/16	15 3/4	15 7/8	15 11/16	15 3/4	15 11/16	15 7/8	15 7/8	15 7/8
No. 2 Amber	15 5/8	15 7/16	15 3/8	15 1/2	15 5/8	15 5/8	15 5/8	15 5/8	15 11/16	15 11/16	15 7/8	15 7/8	15 3/4	15 11/16	15 11/16	15 7/8	15 11/16	15 11/16	15 7/8	15 11/16	15 3/4	15 11/16	15 11/16	15 11/16
No. 3 Amber	15 1/2	15 3/8	15 5/16	15 7/16	15 1/2	15 1/2	15 1/2	15 1/2	15 5/8	15 3/4	15 11/16	15 11/16	15 11/16	15 7/8	15 7/8	15 11/16	15 3/4	15 7/8	15 11/16	15 3/4	15 11/16	15 7/8	15 7/8	15 7/8
No. 4 Amber	15 3/8	15 1/4	15 5/16	15 7/16	15 3/8	15 3/8	15 3/8	15 3/8	15 1/2	15 5/8	15 11/16	15 11/16	15 5/8	15 3/4	15 3/4	15 11/16	15 5/8	15 3/4	15 11/16	15 5/8	15 11/16	15 3/4	15 3/4	15 3/4
Rolled Brown	15 5/16	15 1/16	15 1/16	15 1/4	15 1/16	15 1/16	15 1/16	15 1/16	15 1/16	15 1/16	15 1/16	15 1/16	15 1/16	15 5/16	15 1/16	15 1/2	15 1/2	15 1/16	15 1/16	15 5/16	15 1/16	15 1/2	15 1/2	15 1/2

RUBBER SCRAP

ALL grades of scrap continue in good demand for conversion into reclaim in increasing volume. The reason is found in the firm upward tendency of crude rubber. Inner tubes are in very good demand, both for domestic consumption and for the export trade.

Current price changes are confined to the full line of tubes and pneumatic tire grades except auto tire carcass and black auto peelings.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

March 27, 1936

		Prices	
Boots and Shoes			
Boots and shoes, black	lb.	$0.01	/$0.01⅛
Colored	lb.	.00¾ /	.00⅞
Untrimmed arctics	lb.	.00¾ /	.00⅞
Inner Tubes			
No. 1, floating	lb.	.09 /	.09¼
No. 2, compound	lb.	.04⅛ /	.04¼
Red	lb.	.04 /	.04⅛
Mixed tubes	lb.	.03⅞ /	.04⅛
Tires (Akron District)			
Pneumatic Standard			
Mixed auto tires with beads	ton	9.50	/10.00
Beadless	ton	13.50	/13.75
Auto tire carcass	ton	11.00	/12.00
Black auto peelings	ton	16.00	/17.00
Solid			
Clean mixed truck	ton	35.00	/36.00
Light gravity	ton	38.00	/39.00
Mechanicals			
Mixed black scrap	ton	15.00	/17.00
Hose, air brake	ton	15.00	/16.00
Garden, rubber covered	ton	13.00	/13.50
Steam and water, soft	ton	13.00	/13.50
No. 1 red	lb.	.02½ /	.02⅝
No. 2 red	lb.	.01¾ /	.01⅞
White druggists' sundries	lb.	.03 /	.03¼
Mechanical	lb.	.02½ /	.02¾
Hard Rubber			
No. 1 hard rubber	lb.	.11½ /	.12

RECLAIMED RUBBER

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption % to Crude	U. S. Stocks*	Exports
1933	99,974	81,612	20.1	20,746	3,583
1934	110,010	100,597	22.3	23,079	4,737
1935	122,140	113,530	22.9	25,069	5,383
1936					
January	11,665	10,039	20.7	26,145	....
February	10,188	7,366	20.0	28,267	....

*Stocks on hand the last of the month or year.
Compiled by The Rubber Manufacturers Association, Inc.

THE outlook for a big season in the automobile industry with its demand for tires, tubes, accessories, and batteries is stimulating the output of reclaim of all grades. The settlement of the strike of rubber workers at the Goodyear plant in Akron will restore demand for reclaim that was missed for a month or more. Another important constructive influence is the upward swing of crude rubber prices, which always has a tendency to firm the market for reclaims. Production is active in most of the important rubber goods lines, notably in mechanicals, soles, heels, insulated wire, sundries, proofed clothing, and specialties for sports use.

Current quotations on all basic qualities, except Red Tubes, remain firm and unchanged from the prices of one month ago. In the case of Red Tubes the price has advanced ½c owing to the increased demand.

Rubber Regulation to Date

The following tabulation appeared as a feature of the chart of "Rubber Prices and Stocks" issued by Hecht, Levis & Kahn, Ltd., London, Liverpool, and New York. It shows concisely the basic quotas of crude rubber officially established for each of the rubber producing countries embraced in the restriction scheme and the percentages released quarterly to date by the International Rubber Regulation Committee since the inauguration of the scheme June, 1934.

New York Quotations

March 27, 1936

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	5 / 5¼
Acid	1.18-1.22	6 / 6¼
Shoe		
Standard	1.56-1.60	6½ / 6¾
Tube		
No. 1 Floating	1.00	14 /14¼
Compounded	1.10-1.12	7 / 7¼
Red Tube	1.15-1.30	7 / 7¼
Miscellaneous		
Mechanical Blends	1.25-1.50	3½ / 4¼
White	1.35-1.50	8 / 9¼

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

INTERNATIONAL RUBBER REGULATION SCHEME 1934/1938.

BASIC PRODUCTION QUOTAS FIXED BY THE REGULATION COMMITTEE, IN TONS.

COUNTRY	1934		1935		1936		1937		1938	
	Yearly Total	Monthly Average	Yearly Total	Monthly Average	Yearly Total	Monthly Average	Yearly Total	Monthly Average	Yearly Total	Monthly Average
MALAYA	504,000	42,000	538,000	44,833	569,000	47,417	589,000	49,083	602,000	50,167
NETHERLANDS INDIA	352,000	29,333	400,000	33,333	500,000	41,667	520,000	43,333	540,000	45,000
CEYLON	77,500	6,458	79,000	6,583	80,000	6,667	81,000	6,750	82,500	6,875
INDIA	6,850	571	12,500	1,042	12,500	1,042	12,500	1,042	13,000	1,083
BURMA	5,150	429	8,000	667	8,500	708	9,000	750	9,250	771
NORTH BORNEO	12,000	1,000	13,000	1,084	14,000	1,166	15,500	1,292	16,500	1,375
SARAWAK	24,000	2,000	28,000	2,333	30,000	2,500	31,500	2,625	32,000	2,667
SIAM	15,000	1,250	40,000	3,333	40,000	3,333	40,000	3,333	40,000	3,333
TOTALS	996,500	83,041	1,118,500	93,208	1,254,000	104,500	1,298,500	108,208	1,335,250	111,271

THERE ARE SPECIAL ARRANGEMENTS REGARDING THE EXPORTS FROM INDO-CHINA.

ON THE BASIS OF THE ABOVE FIGURES THE REGULATION COMMITTEE WILL DETERMINE FROM TIME TO TIME THE PERMISSIBLE PERCENTAGES OF THE BASIC QUOTA IN ACCORDANCE WITH EXISTING CONDITIONS.

SINCE THE INAUGURATION OF THE SCHEME THE FOLLOWING PERCENTAGES HAVE BEEN DECREED:-

1934		1935		1936	
JUNE & JULY	100%	JAN./FEB./MAR.	75%	JAN./FEB./MAR.	60%
AUGUST & SEPTEMBER	90%	APL./MAY/JUNE	70%	APL./MAY/JUNE	60%
OCTOBER & NOVEMBER	80%	JULY/AUG./SEPT.	65%		
DECEMBER	70%	OCT./NOV./DEC.	60%		

COMPOUNDING INGREDIENTS

CARBON BLACK. The sale of carbon black for the first quarter of 1936 will show an increase of about 16% over the corresponding period last year. It is anticipated that the same percentage of increase will hold throughout the balance of 1936. At present the prices on the various grades are stable and no changes are expected this year.

FACTICE. The demand for factice holds steady, with an increase for oil-resisting brown grades as rubber manufacturers generally become aware of the compounding value, in that respect, of these grades.

LITHARGE. The price situation continues steady and unchanged since the advance of February 27.

LITHOPONE. The market is quiet, and prices are unchanged.

RUBBER CHEMICALS. A new general-purpose antioxidant is announced, B-X-A, claimed to be of superior ability in preventing flex-cracking; it has no effect on curing and does not require master batching.

The volume demand for accelerators, antioxidants, etc., is well maintained.

RUBBER COLORS. There has been no appreciable change in the market situation on chromium oxides. Prices are steady, but at very low figures—probably below cost of most of the producers. The volume of business remains at about the same level as for the last quarter of 1935.

In organic rubber colors the market remains firm and unchanged, with no prospects of a change in the near future.

RUBBER SOLVENTS. The tire trade requirements appreciably curtailed demand during the period of the rubber strike in Akron. Since that has been settled, demand is restored to the usual seasonal activity at that point. Prices are steady and unchanged.

TITANIUM PIGMENTS. Demand is moving at a good rate. Prices continue firm at the schedules.

ZINC OXIDE. The market situation is gaining strength. Zinc metal is in much better statistical position. Zinc oxide has been too low since last September. Since contracts run until June 30, it is not likely that any price change will occur soon, but some advances of a moderate nature are indicated by the metal situation.

New York Quotations

March 27, 1936

Prices Not Reported Will Be Supplied on Application

Abrasives		
Pumicestone, powdered	lb.	$0.02 /$0.03½
Rottenstone, domestic	lb.	.03 / .03½
Silica, 15	ton	38.00
Accelerators, Inorganic		
Lime, hydrated	ton	20.00
Litharge (commercial)	lb.	.06½/ .07
Magnesia, calcined, heavy	lb.	.04
carbonate	lb.	.06½/ .07
Accelerators, Organic		
A-1	lb.	.21 / .25
A-5-10	lb.	.33 / .36
A-10	lb.	
A-11	lb.	.60 / .75
A-16	lb.	.55 / .65
A-19	lb.	.56 / .75
A-32	lb.	.70 / .80
A-77	lb.	
Accelerator 49	lb.	
808	lb.	
833	lb.	
Acrin	lb.	
Aldehyde ammonia	lb.	
Altax	lb.	
Beutene	lb.	
Butyl Zimate	lb.	
C-P-B	lb.	
Captax	lb.	
Crylene	lb	
Paste	lb.	
D-B-A	lb.	
Di-Esterex	lb.	
Di-Esterex-N	lb.	
DOTG	lb.	
DPG	lb.	
El-Sixty	lb.	
Ethylideneaniline	lb.	
Formaldehyde P.A.C.	lb.	
Formaldehyde-para-toluidine	lb.	
Guantal	lb.	.42 / .51
Hepteen	lb.	
Base	lb.	
Hexamethylenetetramine	lb.	
Lead oleate, No. 999	lb.	.11
Witco	lb.	.11
Methylenedianilide	lb.	
Monex	lb.	
Novex	lb.	
Ovac	lb.	
Pipsolene	lb.	
R-2	lb.	1.50 / 1.90
Base	lb.	4.55 / 5.00
R & H 50-D	lb.	
Safex	lb.	
Super-sulphur No. 1	lb.	
No. 2	lb.	
Tetrone A	lb.	
Thiocarbanilide	lb.	
Thionex	lb.	
Trimene	lb.	
Base	lb.	
Triphenyl guanidine (TPG)	lb.	
Tuads	lb	
Ureka	lb.	.62 / 1.00
Blend B	lb.	
C	lb.	.58 / .69
Vulcanex	lb.	
Vulcanol	lb.	
Vulcone	lb.	
Z-B-X	lb.	
Z-88-P	lb.	$0.48 /$0.60
Zenite	lb.	
A	lb.	
B	lb.	
Zimate	lb.	
Activator		
Barak	lb.	
Age Resisters		
Age-Rite Gel	lb.	
HP	lb.	
Powder	lb.	
Resin	lb.	
D	lb.	
Syrup	lb.	
White	lb.	
Akroflex C	lb.	
Albasan	lb.	
Antox	lb.	
A-V-A-R	lb.	
B-L-E	lb.	
B-X-A	lb.	
Flectol B	lb.	
H	lb.	
White	lb.	
M-U-F	lb.	
Neozone (standard)	lb.	
A	lb.	
C	lb.	
D	lb.	
Oxynone	lb.	
Parazone	lb.	
Perflectol	lb.	
Solux	lb.	
Thermoflex	lb.	
A	lb.	
V-G-B	lb.	
Alkalies		
Caustic soda, flake, Columbia (400 lb. drums)	100 lbs.	3.00 / 4.00
liquid, 50%	100 lbs.	2.25
solid (700 lb. drums)	100 lbs.	2.60 / 3.60
Antiscorch Materials		
Antiscorch T	lb.	
Cumar RH	lb.	.09
Retarder B	lb.	
W	lb.	
T-J-B	lb.	
U.T.B.	lb.	
Antisun Materials		
Heliozone	lb.	
Sunproof	lb.	
Brake Lining Saturant		
B. R. T. No. 3	lb.	.016 / .018
Colors		
BLACK		
Lampblack (commercial)	lb.	.15
BLUE		
Brilliant	lb.	
Prussian	lb.	
Toners	lb.	.80 / 3.50
BROWN		
Mapico	lb.	$0.13
GREEN		
Brilliant	lb.	
Chrome, light	lb.	
medium	lb.	
oxide	lb.	.18½
Dark	lb.	
Guignet's	lb.	.70
Light	lb.	
Toners	lb.	.85 /$3.50
ORANGE		
Lake	lb.	
Toners	lb.	.40 / 1.60
ORCHID		
Toners	lb.	1.50 / 2.00
PINK		
Toners	lb.	1.50 / 4.00
PURPLE		
Permanent	lb.	
Toners	lb.	.60 / 2.00
RED		
Antimony		
Crimson, 15/17%	lb.	
R. M. P. No. 3	lb.	.46
Sulphur free	lb.	.48
Golden 15/17%	lb.	
7-A	lb.	.33
Z-2	lb.	.22
Aristi	lb.	
Cadmium, light (400 lb. bbls.)	lb.	.70
Chinese	lb.	
Crimson	lb.	
Mapico	lb.	
Medium	lb.	
Rub-Er-Red	lb.	.09¼
Scarlet	lb.	
Toners	lb.	.80 / 2.00
WHITE		
Lithopone (bags)	lb.	.04½/ .04¾
Albalith Black Label-11	lb.	.04½/ .04¾
Astrolith (5-ton lots)	lb.	.04½
Azolith	lb.	.04½/ .04¾
Cryptone-19	lb.	.06 / .06¼
CB-21	lb.	.06 / .06¼
ZS No. 20	lb.	.10½/ .10¾
No. 86	lb.	.10½/ .10¾
Sunolith (5-ton lots)	lb.	.04½
Ray-Bar	lb.	
Ray-Cal	lb.	
Rayox	lb.	
Titanolith (5-ton lots)	lb.	.06
Titanox-A (50-lb. bags)	lb.	.17 / .18½
B (50-lb. bags)	lb.	.06 / .06¼
C (50-lb. bags)	lb.	.06 / .06¼
Zinc Oxide		
Anaconda, Green Seal		
No. 333	lb.	.06 / .06¼
Lead Free No. 352	lb.	.05 / .05¼
No. 570	lb.	.05 / .05¼
No. 577	lb.	.05 / .05¼
Red Seal No. 222	lb.	.05½/ .05¾
U.S.P. No. 777 (bbls.)	lb.	.08
White Seal No. 555	lb.	.06½/ .06¾

Azo ZZZ-11	lb.	$0.05 /$0.05¼
44	lb.	.05 / .05¼
55	lb.	.05 / .05¼
66	lb.	.05 / .05¼
French Process, Florence White Seal-7 (bbls.)	lb.	.06½/ .06¾
Green Seal-8	lb.	.06 / .06¾
Red Seal-9	lb.	.05½/ .05¾
Kadox, Black Label-15	lb.	.05 / .05¼
Blue Label-16	lb.	.05 / .05¼
Red Label-17	lb.	.05 / .05¼
Horse Head Special 3	lb.	.05 / .05¼
XX Red-4	lb.	.05 / .05¼
23	lb.	.05 / .05¼
72	lb.	.05 / .05¼
78	lb.	.05 / .05¼
80	lb.	.05 / .05¼
103	lb.	.05 / .05¼
110	lb.	.05 / .05¼
St. Joe (lead free)		
Black Label No. 20	lb.	.05 / .05¼
Green Label No. 42	lb.	.05 / .05¼
Red Label No. 30	lb.	.05 / .05¼
U.S.P. X	lb.	.08
YELLOW		
Cadmolith (cadmium yellow) 400-lb. bbls.	lb.	.45
Lemon	lb.	
Mapico	lb.	.09½
Toners	lb.	2.50

Dispersing Agents

Bardol	lb.	.021 / .023
Darvan	lb.	

Factice—See Rubber Substitutes

Fillers, Inert

Asbestine, c.l., f.o.b. mills	ton	15.00
Barytes	ton	30.00
f.o.b St. Louis (50 lb. paper bags)	ton	22.85
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip.	lb.	.03¼/ .05
Calcene, c.l.	ton	37.50 /45.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	
No. 3	ton	
Whiting		
Columbia Filler	ton	9.00 /14.00
Domestic	100 lbs.	
Guilders	100 lbs.	
Hakuenka	lb.	
Paris white, English cliff-stone	100 lbs.	
Southwark Brand, Commercial	100 lbs.	
All other grades	100 lbs.	
Suprex, white, extra light	ton	45.40 /60.00
heavy	ton	45.40 /60.00
Witco, c.l.	ton	7.00

Fillers for Pliability

Fumonex, c.l., f.o.b. works	lb.	.03
ex-warehouse	lb.	.04½
P-33	lb.	
Thermax	lb.	
Velvetex	lb.	.03 / .04½

Finishes

IVCO lacquer, clear	gal.	
colors	gal.	
Rubber lacquer, clear	gal.	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00
Dusting	ton	
Pyrax	ton	

Flock

Cotton flock, dark	lb.	.11¼/ .14
dyed	lb.	.50 / .85
white	lb.	.14½/ .20
Rayon flock, colored	lb.	1.25 / 1.60
white	lb.	1.10

Latex Compounding Ingredients

Accelerator 85	lb.	
89	lb.	
122	lb.	
552	lb.	
Alphasol-OS	lb.	
Antox, Dispersed	lb.	
Aquarex A	lb.	
D	lb.	
F	lb.	
Aresklene	lb.	
Catalpo	ton	
Color Pastes, Dispersed	lb.	
Dispersaid	lb.	1.50
Dispersex 15	lb.	.95
20	lb.	.75
Emo, brown	lb.	.13
white	lb.	.13
Factice Compound, Dispersed	lb.	.30
Heliozone, Dispersed	lb.	
Igepon A	lb.	
Micronex, Colloidal (75 lbs.)	lb.	.11
320 lbs.	lb.	.08
Nekal BX (dry)	lb.	
Palmol	lb.	.09
Paradors	lb.	
Stablex A	lb.	1.75
B	lb.	.90
C	lb.	.30
Tepidone	lb.	
Vulcan Colors	lb.	
Zinc oxide, Colloidal	lb.	

Mineral Rubber

B. R. C. No. 20	lb.	$0.0125/$0.014
Black Diamond	ton	25.00
Genasco Hydrocarbon, granulated, (fact'y)	ton	
solid	ton	
Gilsonite Hydrocarbon (factory)	ton	
Hydrocarbon, hard	ton	
soft	ton	
Parmr Grade 1, l.c.l.	ton	31.00
Grade 2	ton	31.00
Pioneer	ton	
265°	ton	

Mold Lubricants

Mold Paste No. 1	lb.	
Rusco mold paste	lb.	.12 / .30
Sericite	ton	65.00 /70.00
Soapbark	lb.	
Soapstone	ton	25.00 /35.00

Oil Resistant

AXF	lb.	

Reclaiming Oils

B. R. V.	lb.	.039 / .041
S. R. O.	lb.	.015 / .019

Reenforcers

Carbon Black		
Aerfloted Arrow Specification Black	lb.	.0535/ .0825
Arrow Compact Granualized Carbon Black	lb.	
"Certified" Spheron, Cabot	lb.	
Disperso (delivered)	lb.	.0445/ .0535
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Dixiedensed, c.l, f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Excello, c.l., f.o.b Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0505/ .0705
l.c.l., delivered New York	lb.	.07 / .08¼
Gastex	lb.	.03 / .07
Kosmobile, c.l., f.o.b New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex.	lb.	.0445
c.l., delivered New York	lb.	.0535
local stock delivered	lb.	.07 / .08¼
Micronex Beads	lb.	
Mark II	lb.	
Standard	lb.	
W-5	lb.	
W-6	lb.	
Pelletex	lb.	.03 / .07
Supreme, c.l., f.o.b. Gulf ports	lb.	.0445/ .0645
delivered New York	lb.	.0505/ .0705
l.c.l., delivered New York	lb.	.07 / .08¼
Carbonex	lb.	.03 / .0375
Carbonex "S"	lb.	.0315/ .04
Clays		
Aerfloted Paragon	ton	8.50
Suprex No. 1 Selected	ton	10.00
No. 2 Standard	ton	8.50
Dixie	ton	
Junior	ton	
McNamee	ton	
Par	ton	
Witco	ton	8.50
Cumar EX	lb.	.04

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Paradors	lb.	
Rodo No. 0	lb.	
No. 10	lb.	

Rubber Substitutes or Factice

Amberex	lb.	.26
Black	lb.	.07 / .11
Brown	lb.	.08 / .14
Duphax A	lb.	.11
B	lb.	.11
Fac-Cel B	lb.	.13
C	lb.	.13
White	lb.	.08½/ .13

Softeners

Burgundy pitch	lb.	.05
Cycline oil	gal.	.15 / .28
Palm oil (Witco)	lb.	.05½
Petrolatum, amber (f.o.b. refinery, Warren, Pa.)	lb.	.02¼/ .03¼
light amber	lb.	.02¾/ .03½
Pine tar	gal.	
Plastogen	lb.	
Reogen	lb.	
Rosin oil, compounded	gal.	$0.40
RPA No. 1	lb.	
Rubtack	lb.	.10
Tackol	lb.	.085 /$0.18
Tonox	lb.	
Powder	lb.	
Witco No. 20	gal.	.15

Softeners for Hard Rubber Compounding

RSL Resin	lb.	
Resin C Pitch 55° C. M.P.	lb.	.0125/ .0145
Resin C Pitch 70° C. M.P.	lb.	.0125/ .0145
Resin C Pitch 85° C. M.P.	lb.	.0125/ .0145

Solvents

Beta-Trichlorethane	gal.	
Bondogen	lb.	
Carbon bisulphide	lb.	
tetrachloride	lb.	

Stabilizers for Cure

Laurex, ton lots	lb.	
Stearex B	lb.	.10¼/ .11¾
Beads	lb.	.086
Stearic acid, single pressed	lb.	.11 / .13
Stearite	lb.	.08
Zinc stearate	lb.	.22

Synthetic Rubber

"DuPrene"[1] Latex Type 50,	lb.	
53	lb.	
54	lb.	
Type E	lb.	
"Thiokol" A (f.o.b. Yardville)	lb.	.35
Coating Materials	gal.	3.00 / 5.00
D	lb.	.65
Molding Powder	lb.	.55 / .70

Tackifier

B. R. H. No. 2	lb.	.014 / .02

Varnish

Shoe	gal.	1.45

Vulcanizing Ingredients

Sulphur		
Chloride, drums	lb.	.03½/ .04
Rubber	100 lbs.	
Telloy	lb.	
Vandex	lb.	

(See also Colors—Antimony)

Waxes

Carnauba, No. 3 chalky	lb.	
2 N.C.	lb.	
3 N.C.	lb.	
1 Yellow	lb.	
2	lb.	
Montan, crude	lb.	

[1] Trade mark registered.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Charing Cross, London, S.W.1, England, gives the following figures for February, 1936:

Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

To	Sheet and Crepe Rubber Tons (February, 1936)	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons (February, 1936)
United Kingdom	4,454	401
United States	23,000	538
Continent of Europe	3,948	315
British possessions	2,376	26
Japan	2,538	..
Other countries	830	10
Totals	37,146	1,290

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons (February, 1936)	Wet Rubber (Dry Weight) Tons (February, 1936)
Sumatra	5,509	2,616
Dutch Borneo	3,902	154
Java and other Dutch islands	288	1
Sarawak	1,921	221
British Borneo	219	13
Burma	252	41
Siam	1,920	1,511
French Indo-China	84	95
Other countries	101	9
Totals	14,196	4,661

—we are supplying our customers with CADMIUM RED at reasonable prices!"

● Our extensive resources enable us to supply our customers' needs *without delay.*

Our CADMIUM REDS are alkali-resistant . . . stand high-test cures . . . free from soluble salts. If you make *anything* in rubber, write for complete CADMIUM RED story now.

THE CHEMICAL & PIGMENT COMPANY

St. Helena, Baltimore, Md.
P. O. Box 191, Collinsville, Ill.

Manufacturers of Astrolith and Sunolith, Lithopone, Cadmium Red, Cadmolith, Titanolith {Patent No. 1600772-3}, Zopaque {TiO2}

CONSTANT VIGILANCE QUALITY ALWAYS

Marshall Dill, 510 Montgomery Street, San Francisco, California

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"INDIA-RUBBER JOURNAL"?

The "India-Rubber Journal" is interested in all new applications for rubber and all technical developments in the Industry—send news of anything you are doing in this direction.

The "India-Rubber Journal" also particularly seeks articles and short notes from American Technologists and practical men regarding new lines of manufacture or anything fresh in general rubber practice.

The subscription rate is 20/—per annum, post free, for 53 issues, commencing at any date. Please remit by Bank Draft payable in England.

37 & 38, Shoe Lane, London, E. C. 4, England

Regular and Special Constructions

of

COTTON FABRICS

Single Filling Double Filling

and

ARMY

Ducks

HOSE and BELTING

Ducks

Drills

Selected

Osnaburgs

Curran & Barry

320 BROADWAY

NEW YORK

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Feb. 1	Feb. 29	Mar. 7	Mar. 14	Mar. 21
Feb.	11.25	.....	.....	.....	.....
Mar.	11.10	11.20	11.27	11.31	11.41
Apr.	.....	11.01	11.06	11.13	11.23
July	10.52	10.45	10.55	10.62	10.72
Sept.	10.32	10.30	10.37	10.44	10.44
Dec.	10.20	10.03	10.22	10.25	10.24
Jan.	10.16	10.05	10.25	10.26	10.26

New York Quotations

March 27, 1936

Drills	
38-inch 2.00-yard ..... yd.	$0.14¼
40-inch 3.47-yard	.08⅝
50-inch 1.52-yard	.19¼
52-inch 1.85-yard	.16¾
52-inch 1.90-yard	.14⅝
52-inch 2.20-yard	.13¼
52-inch 2.50-yard	.12½
59-inch 1.85-yard	.15
Ducks	
38-inch 2.00-yard D. F. ..... yd.	$0.14¼/.15
40-inch 1.45-yard S. F.	.19⅝
51½-inch 1.35-yard D. F.	.21½
72-inch 1.05-yard D. F.	.28⅝/.30
72-inch 17.21-ounce	.33⅞
MECHANICALS	
Hose and belting ..... lb.	.28½
TENNIS	
52-inch 1.35-yard ..... yd.	.21⅛
***Hollands**	
GOLD SEAL	
20-inch No. 72 ..... yd.	.09
30-inch No. 72	.17¼
40-inch No. 72	.18
RED SEAL	
20-inch ..... yd.	.08¼
30-inch	.15¾
40-inch	.16½
50-inch	.21
Osnaburgs	
40-inch 2.34-yard ..... yd.	.10⅞/.12⅛
40-inch 2.48-yard	.10¼/.11½
40-inch 2.56-yard	.10
40-inch 3.00-yard	.09½
40-inch 7-ounce part waste	.10
40-inch 10-ounce part waste	.14¼
37-inch 2.42-yard	.11¾
Raincoat Fabrics	
COTTON	
Bombazine 60 x 64 ..... yd.	.08¼
Plaids 60 x 48	.11½
Surface prints 60 x 64	.12½
Print cloth, 38½-inch, 60 x 64 ...	.05½
SHEETINGS, 40-INCH	
48 x 64, 2.50-yard ..... yd.	.08⅞
64 x 68, 3.15-yard	.08¾
56 x 60, 3.60-yard	.07¾
44 x 48, 3.75-yard	.06
SHEETINGS, 36-INCH	
48 x 64, 2.50-yard ..... yd.	.05¼
44 x 40, 6.15-yard	.04¼
Tire Fabrics	
BUILDER	
17¼ ounce 60" 23/11 ply Karded peeler ..... lb.	.33
CHAFER	
14 ounce 60" 20/8 ply Karded peeler ..... lb.	.31
9¾ ounce 60" 10/2 ply Karded peeler ..... lb.	.32
CORD FABRICS	
23/5/3 Karded peeler, 1 1/16" cotton ..... lb.	.32
15/3/3 Karded peeler, 1 1/16" cotton ..... lb.	.30
23/5/3 Karded peeler, 1¼" cotton ..... lb.	.36
23/5/3 Combed Egyptian ..... lb.	.48
LENO BREAKER	
8¾ ounce and 10¼ ounce 60" Karded peeler ..... lb.	.32

*For less than 1,000 yards of a width add 10% to given prices.

AS USUAL the cotton futures market is largely a game of guessing what will be the next move of the Government pool interests. It was rumored that the Government held about 180,000 bales of March contracts of which about half were sold by the middle of the month. Pool interests were said to have given assurances that holdings of futures would be released only when the price would exceed the average spot price at seven representative southern points; however the plan was not followed. Trader interest was of the same cautious and sparing type that has characterized the market since Government control began. Prices varied generally through a narrow range, with a slight upward trend, although at times distant futures sold below 10¢. The rising tendency was stimulated partly by the war threats in Europe, but mainly by the increased activity of mill operations here and abroad. Legislators' attention seemed to be occupied with attempts to simulate the disqualified AAA regulations under the soil conservation act, Senate committee investigation of the sharp price reaction of one year ago, and the Smith bill particulars, which among other considerations advocates liquidating pool holdings on the basis of a stipulated amount per month over a long period of time. Opposing this plan as unsound, John H. McFadden, Jr., president of the New York Cotton Exchange, recommended to the special Senate investigating committee that the Government let the trade absorb its present holdings, then discontinue marketing interference so that the market could resume its normal operations. Trade complaints, according to *The Journal of Commerce*, are becoming increasingly prevalent that pool operations are contributing to a market "muddle."

Cotton exports have improved to date this year as against last by 1,253 bales. Improvement in mill activity in this country is also evidenced by total forwardings to date of 4,413 bales as against 3,341 for the same period last year.

Cotton Fabrics

The market for cotton fabrics is without particular feature. The demand is fair and at times sluggish, with only filling-in business being placed. It has been sufficient, however, to enable the mills to keep from accumulating goods. Thus, any stimulation in business would likely lead to a prompt clearance of inventories.

The raincoat business is very quiet owing to the fact that the seasons are changing and all manufacturers are showing their fall lines. The present outlook leads them to expect a volume of business exceeding that of any fall in many years.

"Plus Ply" Tire

NEW ENGLAND

(*Continued from page* 59)

main plant under the direction of H. B. Begg, president and general manager.

The Davis-Jones Wire Co., Phillipsdale, R. I., which recently purchased the property of the Potter Fine Spinners, Inc., Pawtucket, R. I., plans to begin operations there as soon as the latter concern moves its machinery.

White Sidewall Tire

A NEW type of white sidewall tire, of an entirely new principle in tire construction and built according to the Norwalk Tire & Rubber Co.'s specifications, was demonstrated at the Boston, Portland, and Hartford shows as well as the Automotive Parts Show in Atlantic City.

J. W. Whitehead, Norwalk president, says that the "Plus Ply" adds approximately 25% more carcass strength without any sacrifice whatever in flexibility. After eighteen months of testing in Florida, Texas, and New England, this new tire shows less susceptibility to checking or cracking than any of the other white wall tires tested with it. The "non-skid" design offers greater safety without forward or side skidding than that of any product manufactured by the company since its inception twenty-one years ago.

Haiti. There are about 160 acres of mixed rubber, planted many years ago on the Bayeux plantation, and about 40 acres of *Hevea* near Port-au-Prince, where the U. S. Department of Agriculture also carried on experimental work.

COLUMBUS SHEETINGS

for the Rubber Trade

It is important that rubber manufacturers recognize that COLUMBUS SHEETINGS are made to meet their most rigid *specifications.*

For many years, we have worked with purchasing agents and engineers of the rubber industry and can give positive assurance of the performance of this famous line of industrial sheetings.

WELLINGTON SEARS COMPANY
65 WORTH STREET NEW YORK CITY

Boston Philadelphia Atlanta Detroit Chicago St. Louis New Orleans San Francisco

New Goods and Specialties

Rubber-Tired Motor Glide

CARRIED in the airplane of Col. Roscoe Turner, one of America's outstanding speed pilots and holder of many transcontinental plane records, is a novel vehicle built especially for him, known as a motor glide. When he lands at an airport, often some miles from the nearest city, the colonel climbs on his motor glide and speeds away. It is his third different type of transportation to be General-equipped, the others being his plane and his cars. On the streamline Jumbo Junior tires on his motor glide he gets five miles at a fuel cost of one cent. These tires are made by The General Tire & Rubber Co., Akron, O.

Colonel Turner on His Motor Glide

Flexible Steering Wheel

FLEXIBLE wheels have been used abroad for years, but their introduction here is just starting. Many advantages are claimed for them. They cushion wrists and arms against vibration, reduce driving fatigue to a minimum, and give a delightful new feel to the steering wheel by the elimination of stiffness.

With all these thoughts in mind Carl B. Seaman designed a banjo-type wheel to conform more to the shape of the hand and to provide greater safety and driving ease. These wheels are made for the Safeflex Co. by the American Hard Rubber Co.

The wheel itself is 17¼ inches in diameter, and the rim ¾-inch in diameter. The latter, of polished stainless black rubber, is reenforced with a steel ring and also has finger impressions. Its three spokes each consist of three stainless spring steel wires to give flexibility. These spokes are rubber covered down from the rim to provide a comfortable grip for spoke drivers, tipped with stainless steel ferrule. The hub is chromium plated, double key-way. The whole wheel is of substantial construction, beautifully finished.

Safeflex DeLuxe Wheel

Korolac No. 27

KOROLAC is a solution of Koroseal, a new synthetic rubber-like material, developed by The B. F. Goodrich Co., Akron, O. It is recommended as a covering for plating racks, applied by the user, providing a translucent, corrosion resisting, tough, inert coating with good insulating properties, satisfactory for practically all kinds of plating service. At normal temperatures Korolac is jelly-like, but when heated becomes liquid and is then ready for rack immersion. It holds its position because it shrinks on cooling. It does not adhere to other materials; therefore it cannot be used on plane surfaces. Plating solutions, even those used for chromium and silver, are not contaminated or fouled by thoroughly dried Korolac. The film is very tough and elastic and is subject to damage only by severe physical abuse. If the film is broken, it can be easily repaired.

Sales Demonstrator

UNUSUAL interest is being displayed in a novel type of anti-skid tire demonstrator displaying the new features of General Tire company's new Dual 10 tires. The demonstrator is electrically lighted and motor operated. The tire pictured in the center appears to spin and stop. The tread prints on the side panels flash on and off as the tire runs and stops. This spinning and stopping action continues as long as the electric connection is made.

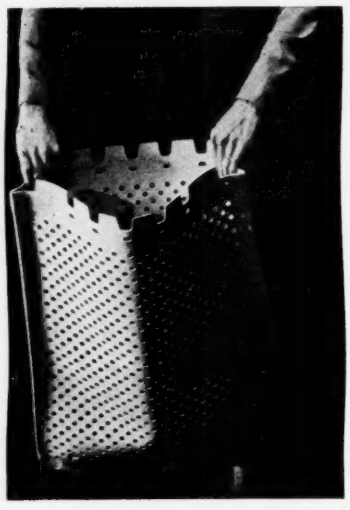
Rubber Laundry Net

A RUBBER laundry net said to solve several of the more pressing problems of the industry has been produced by United States Rubber Products, Inc., after eighteen months of experimental work in conjunction with the American Institute of Laundering and with a further six months' collaboration with some twenty commercial laundries.

Laundry patrons have probably ruminated at one time or another on the problem a laundry faces in retaining the identity of the numerous shirts and pajamas dumped into its tubs in the course of a day's work. The secret, of course, is that they are not dumped into the tubs *en masse*, but are placed in nets and washed in units.

This procedure has, in the past, given rise to a problem—each time the contents are washed the net is washed too. Laundry statisticians have figured that in the course of a year's time the average-size laundry wastes seven or eight weeks washing and rewashing the old-style nets. This problem has been solved by the development of a rubber net that will not wash with the clothes it holds.

Two other outstanding advantages of the rubber net are: (1) rubber nets do not burst and mix your clothes with those of your tub mates, and (2) the danger of tearing clothes while washing is considerably reduced. *Scientific American.*



Improved Net for Laundries

RMP
ANTIMONY
FOR RED RUBBER

. . . . The utmost in pleasing appearance with no deteriorating effect whatever.

●

RARE METAL PRODUCTS CO.
BELLEVILLE, N. J.

★

TO PRODUCERS OF RUBBER BOOTS AND SHOES

WE are manufacturers of the Patten Air Lift Motor driven machine used for cutting taps and soles from sheet rubber.

In the hands of competent and experienced operators this machine should cut from 3,500 to 5,000 pairs per day, producing a sole or tap with beveled edge of 27° to 90°, and is the latest up-to-date type of machine for this purpose.

We are in position to make delivery within thirty days after receipt of order.

★

WELLMAN COMPANY
MACHINISTS
MEDFORD, MASS., U.S.A.

COLONIAL
One-Piece Closed End Forms
Save TIME and MONEY

THE Vitreous Porcelain closed end forms originated and made by us exclusively, are in a class by themselves.

Makers of dipped rubber goods all 'round the world have standardized on this patented type of Colonial form because they save time and money.

When you need forms for gloves or any other dipped goods, send us your blue print or sketch for our suggestions and prices.

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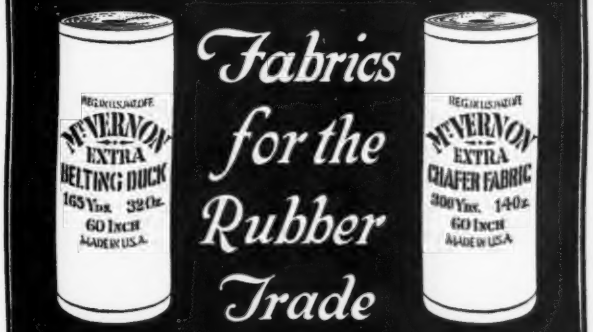

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(*Continued on page* 90)

BOOK REVIEWS

"How to Protect Business Ideas. A Study of Trade Marks, Patents, Copyrights, Labels, and Kindred Properties." By William H. Leahy. Foreword by Isaac W. Diggs. Harper & Brothers, Publishers, New York, N. Y., 1936. Cloth, 157 pages, 5½ by 9 inches. Indexed. Price $2.50.

Corporations and individuals anxious to protect their rights to distinguishing ideas and designs will find here a reliable guide to forestall legal difficulties, litigations, and infringements. This book presents for the first time in one compact, inexpensive volume a simple yet authoritative study of what to most people is unknown territory—the whole story of how to obtain and use to the best advantage trade marks, patents, copyrights, labels, and kindred properties. Anyone wishing to promote ideas or suggestions dealing with any one of a number of fields: merchandise, machines, formulae, processes, designs, or advertising, will find this new volume an invaluable handbook of advice and suggestions for protecting his legal rights and privileges.

"Glances at Industrial Research during Walks and Talks in Mellon Institute." By Edward R. Weidlein and William A. Hamor. Mellon Institute of Industrial Research, Pittsburgh, Pa. Reinhold Publishing Corp., New York, N. Y., 1936. Cloth, 240 pages, 5 by 7½ inches. Illustrated. Indexed. Price $2.75.

The authors of this book have been highly successful in their object of showing the contributory relation of Mellon Institute to recent industrial research progress and in presenting the Industrial Fellowship System of that institution as a productive force in technological advancement. The volume comprises some of their essays on industrial and research topics, published since 1931, revised and joined to discussions of other phases of industrial research management that are pertinent and will be informative to progressive business men.

The book has five parts: (1) Industrial Research Procedure of Mellon Institute; (2) Industrial Research Successes and Opportunities; (3) Professional Aspects of Industrial Research; (4) Questions in Industrial Research Management; (5) Literary Activities in Industrial Research. An appendix of chronological tables gives in compact form the most important developments in the chemical industries and also the outstanding incidents in the chemical profession and in research in pure chemistry in the United States since the beginning of the World War in 1914.

"Proceedings of the Thirty-eighth Annual Meeting Held at Detroit, Mich., June 24-28, 1935." Vol. 35. American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. Illustrated. Subject and author indices. Part I, 1,488 pages; Part II, 769 pages; 6 x 9 inches. Parts I and II at $5.50 each in stiff paper covers; in cloth at $6; in half leather $7.

Part I comprises committee reports (and appended papers) and the new and revised A.S.T.M. tentative standards. Reports from forty standing committees are included, 136 tentative specifications either newly published or revised in 1935, also many new proposed standard specifications and methods of testing materials not previously covered. These are given in their latest approved form.

Part II gives all technical papers, including the Marburg Lecture. In addition to the thirty-seven technical papers presented at the 1935 annual meeting, Part II gives the extensive written and oral discussion, thus providing various viewpoints on the respective subjects. (About 150 pages are devoted to discussion.) The Marburg Lecture on "Aircraft: Materials and Testing" is included in this part.

The Symposium on Spectrographic Analysis comprises six technical papers describing methods in current use as applied to various materials—steel, platinum, magnesium and other nonferrous materials, graphite electrodes, etc.

"Sur la Saignée de L'Hevea." By François J. Gain. Printed by Georges Thomas, Corner of Solignac and Henri Lepage Sts., Nancy, France. 1935. Paper, 162 pages, 6¼ by 9½ inches. Illustrated.

This volume, in French, is introduced by references to the economic aspects of rubber, plantation areas, and prices followed by three chapters discussing respectively (1) the lactiferous system of *Hevea*, physiology of latex secretion and tapping; (2) the evolution of the tapping system; and (3) improved working methods.

"Behavior of the Automobile Industry in the Depression." By John W. Scoville, Chrysler Corp., New York, N. Y. 1936. Paper, 31 pages, 7 by 9 inches. 39 charts.

This pamphlet by the chief statistician of the Chrysler Corp. is an address delivered before the Economic Society, Roosevelt Hotel, New York, December 30, 1935. The author's discussion so commanded the appreciation of the business world that it is issued for wider reading. Its correlation of essential facts is displayed in many charts showing the crushing force of the great depression on the automobile industry and its reliance on its own resources in leading in the recovery now in progress.

(*Continued on page* 90)

NEW PUBLICATIONS

Robertson Reminders. March, 1936. John Robertson Co., Inc., 121-35 Water St., Brooklyn, N. Y. This pamphlet describes a few Robertson machinery products as presses and pumps for the process industries for which the company has designed special extrusion and other equipment.

Witcombings. Wishnick-Tumpeer, Inc., 295 Madison Ave., New York, N. Y. The February-March issue contains a number of interesting short articles and notes on matters of interest to rubber compounders and other technologists engaged in the rubber, paint, and ink industries, and also pertinent remarks of importance to purchasing agents and production and plant men.

"Nathaniel M. Hayward." General Atlas Carbon Co., 60 Wall St., New York, N. Y. This four-page folder contains a brief sketch of this inventor and his contact with Goodyear in their efforts to discover vulcanization.

"Goodrich Red Book—1936." The B. F. Goodrich Co., Akron, O. This book of sixty-four pages catalogs all Goodrich products and sales helps for the tire, battery, and accessory dealer. Also included are miscellaneous advisory services on sales promotion, etc.

"Tyrwelder Improved Full Circle Retreaders." The Akron Tyrwelder Co., Division of The Akron Equipment Co., Akron, O. This illustrated bulletin relates to a well-known retreading appliance, accessories, use and capacity for service.

"Waldron Embossing Machines." Catalog No. 110. John Waldron Corp., New Brunswick, N. J. This twenty-page book on embossing machines is intended as a guide to those charged with the responsibility for producing quality embossing with utmost care and efficiency. It describes in detail the art of embossing, development of embossing machines, characteristics of embossing on various types of materials, construction of the famous Waldron embossing roll, and also provides full details for selection of proper machines for material to be embossed.

"Agitators by Patterson." The Patterson Foundry & Machine Co., East Liverpool, O. This broadside illustrates and describes an extensive line of belt and motor driven agitators for mixing and stirring liquids and dry materials.

"The Playthings Directory of the Toy Industry—1936." The McReady Publishing Co., 381 Fourth Ave., New York, N. Y. This directory contains alphabetical list of manufacturers, classified list of toys, games, etc., trade marks and trade names, and a directory of supplies for manufacturers.

"Transactions Institution of the Rubber Industry." Index, Volumes I-X, 1925-1935. W. Heffer & Sons, Ltd., Cambridge, England. Paper, 5½ by 8½ inches. Price 5 shillings.

"Royle Perfected Circular Looms." John Royle & Sons, Paterson, N. J. This illustrated thirty-six page pamphlet designated as "Circular No. 295" is virtually a text-book on the many features of unusual merit that have been developed in these machines. The circular loom, its parts and fittings are described, and their functions and operation explained. Notes on the method of weaving are included.

"Hodgman Sporting Specialties for 1936." Hodgman Rubber Co., Framingham, Mass. An interesting line of sports equipment of latest design is presented in this catalog. There are included waders, jackets, ponchos, blankets, hunt suits and caps, camp air beds, air pillows, and air rafts. An interesting feature is the inclusion of a page of samples of the rubber and fabric combinations used in construction of the various items described.

"1936 Year Book." The Tire & Rim Association, Inc., 1401 Guarantee Title Bldg., Cleveland, O. Price $2. In this publication are included complete data on all rims, tires, tubes, and valves, arranged in thumb indexed sections for quick reference. The contents, being official, are indispensable to manufacturers, inspectors, and all concerned in tire equipment.

"Multistory or Single Story—Which?" The Austin Co., Cleveland, O. This eight-page pamphlet pictures and discusses the economy of plants designed in the modern single-story construction, contrasting its economy with plants of multiple stories both in construction and operating cost.

"Retread Market." James C. Heintz & Co., 3738-46 W. 143rd St., Cleveland, O. This broadside pertains to this concern's C. A. unit for tire retreading, with full data and illustrations of its parts.

"Dial Indicators and Precision Measuring Instruments." Federal Products Corp., Providence, R. I. This catalog, dated February, 1936, illustrates and describes the company's complete line of gages and includes several new models, with advantageous practical features together with specifications and diagrams which were not included in previous editions of the book.

"International Trade in Machinery Belting." Circular No. 3,603, Foreign and Domestic Bulletin Service. Compiled and issued by Leather and Rubber Division. E. G. Holt, Assistant Chief, Department of Commerce, Bureau of Foreign and Domestic Commerce, Alexander V. Dye, Director, Washington, D. C. Price 10¢ per copy. Classified statistics of international trade on rubber, leather, and other classes of belting are given for the years 1925 to 1935 inclusive.

Patents and Trade Marks

MACHINERY

United States

2,028,144. **Thread Splicer.** J. F. Cavanagh, Providence, R. I.

2,028,190. **Impact Tester.** R. Burns, Brooklyn, assignor to Bell Telephone Laboratories, Inc., New York, both in N. Y.

2,028,440. **Tire Spreader.** W. H. Dalrymple, Brucefield, Ont., Canada.

2,028,618. **Vulcanizing Press.** C. Macbeth, Birmingham, England.

2,028,695. **Tire Shaper and Expansible Core Mounter.** H. D. Stevens, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,028,808. **Mold.** L. M. Rosenthal; A. Rosenthal, executrix of said L. M. Rosenthal, deceased, both of New York, N. Y.

2,028,986. **Tire Spreader.** M. Mathiesen, Chicago, assignor to J. H. Lee, River Forest, both in Ill.

2,029,060. **Vulcanizing Press.** G. Cozzo, assignor to Società Italiana Pirelli, both of Milan, Italy.

2,029,359. **Shirrer.** A. E. Collins, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,029,435. **Sheathed Article Producer.** C. F. Moody, Yonkers, and E. A. Mitchell, Hastings-on-the-Hudson, assignors to Phelps Dodge Copper Products Corp., New York, N. Y.

2,029,533. **Footwear Sole Edge Closer.** F. D. Kinney, Southbridge, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,029,831. **Latex Concentrator.** A. E. Petersen, Frankfurt a. M., and W. Gensecke, Gonzenheim, assignors to Metallgesellschaft A. G., Frankfurt a. M., all in Germany.

2,029,879. **Knitting Machine.** G. W. Lindley, Philadelphia, Pa.

2,030,208. **Elastic Thread Apparatus.** M. M. Harrison, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,030,451. **Time Cycle Controller.** W. J. Kerr, Waterbury, and E. C. Miller, Naugatuck, assignors to Bristol Co., Waterbury, all in Conn.

2,030,475. **Hardness Indicator Penetrator Stem.** A. F. Shore, New York, N. Y.

2,030,744. **Draper.** E. H. Clark, Reading, Mass., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,030,749. **Tire Building Drum.** A. L. Heston, Columbiana, assignor to National Rubber Machinery Co., Akron, both in O.

2,030,861. **Tire Retreader.** M. M. Fisher, Seattle, Wash.

2,030,949. **Mixing Mill.** D. L. White, assignor to Hood Rubber Co., Inc., both of Watertown, Mass.

2,031,028. **Tire Groover.** C. F. Boyer and G. W. Fouke, assignors to Kwick-Kut Mfg. Co., Inc., all of St. Louis, Mo.

2,031,094. **Textile Impregnator.** J. Brandwood, Southport, England.

2,031,401. **Bias Cut Fabric Severer.** H. Willshaw, Wylde Green, and H. Smith and F. A. Davenport, both of Birmingham, all in England, assignors to Dunlop Tire & Rubber Corp., Buffalo, N. Y.

2,031,418. **Container Producer.** H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,031,472. **Tire Groover.** W. F. Errig, Philadelphia, and G. M. Pfundt, Churchville, assignors to Peco Mfg. Corp., Philadelphia, all in Pa.

2,031,560 and 2,031,561. **Rubber Article Treater.** R. B. Day, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

Dominion of Canada

355,295. **Pipe Liner.** E. F. T. Splatt, Hampton, Victoria, Australia.

355,333. **Resilient Material Divider.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of H. Willshaw and F. G. Broadbent, co-inventors, both of Birmingham, England.

355,400. **Bias Cutter.** P. Gardner, New York, and H. Gerstein, Arverne, co-inventors, both in N. Y., U. S. A.

355,485. **Divided Material Distributer.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of E. W. Madge and F. J. Payne, co-inventors, both of Birmingham, England.

355,528. **Tire Patch Cutter.** Van Cleef Bros., assignee of P. Van Cleef, both of Chicago, Ill., U. S. A.

355,624. **Tire Stitcher.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of G. F. Wikle, Ann Arbor, Mich., U. S. A.

355,807. **Chlorinated Rubber Treater.** Rubber Producers Research Assn., assignee of P. Schidrowitz and C. A. Redfarn, co-inventors, all of London, England.

United Kingdom

436,864 and 436,947. **Wire Coating Extrusion Head.** St. Helens Cable & Rubber Co., Ltd., Slough; H. C. Harrison, Taplow, and A. J. Ensor, Slough.

437,106. **Feeding Balls from Shoots.** Dunlop Rubber Co., Ltd., London, and H. Willshaw, D. F. Twiss, S. N. Goodhall, and F. A. Jones, all of Birmingham.

437,246. **Tire Distance Measurer.** P. Zucker, Zurich, Switzerland.

437,775. **Molding Strips by Dipping.** S. Saul, Aachen, Germany.

437,869. **Rubber Treater.** Soc. Italiana Pirelli, Milan, Italy.

438,136. **Spinning Pot.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and H. L. Harding, London.

Germany

626,081. **Mixer.** David Bridge & Co., Ltd., Castleton, England. Represented by A. Zehnder, Berlin-Charlottenburg.

626,438. **Hose Ring Press.** W. W. Potter, Pawtucket, R. I., U. S. A. Represented by K. T. Hegel, Berlin.

626,439. **Tire Tread Groover.** L. H. Cohen, Amsterdam, Holland. Represented by B. Wehr and H. Seiler, both of Berlin.

626,801. **Rope Press.** B. F. Goodrich Co., New York, N. Y., U. S. A. Represented by G. Bertram, K. Lengner, and H. Kosel, all of Berlin.

626,826. **Apparatus and Method for Producing Rubber Threads.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by C. and E. Wiegand, both of Berlin.

PROCESS

United States

2,029,129. **Connecting Exhalation Valve with Gas Mask.** N. Schwartz, New York, N. Y.

2,029,172. **Leather Substitute.** A. J. Hanley, assignor to Respro, Inc., both of Cranston, R. I.

2,029,260. **Adhesive Tape and Gauze Dressing.** W. Eustis, Newton, Mass., and P. Walter, Chicago, Ill., assignors to Kendall Co., Chicago, Ill.

2,029,361. **Producing Surfaces of Comminuted Material.** A. L. Diller, Belmont, and L. H. L'Hollier, Waltham, assignors to Hood Rubber Co., Inc., Watertown, all in Mass.

2,029,371. **Footwear.** W. R. Hickler, Weston, assignor to Hood Rubber Co., Inc., Watertown, both in Mass.

2,029,379. **Ornamented Rubber Article.** L. H. L'Hollier, Waltham, and A. L. Diller, Belmont, assignors to Hood Rubber Co., Inc., Watertown, all in Mass.

2,029,768. **Printed Fabric.** D. Ferguson, New Haven, Conn., and H. H. Schell, Garden City, N. Y., assignors to Sidney Blumenthal & Co., Inc., New York, N. Y.

2,030,055. **Nonslippery Floor Wax.** T. G. Dixon, Brooklyn, N. Y.

2,030,080. **Cable Splice.** R. C. Waldron, Clifton, assignor to Okonite Co., Passaic, both in N. J.

2,030,191. **Softening and Denerving Rubber.** R. M. Ungar, London, assignor, by direct and mesne assignments, to Softened Rubber, Ltd., Manchester, both in England.

2,030,610. **Elastic Yarn.** N. E. Randall, Shannock, R. I.

2,030,729. **Rubber Film.** P. H. Watkins, Naugatuck, Conn., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,030,746. **Crinkled Sheet Material.** J. J. Galligan, Providence, R. I., and F. O. Thornton, Jr., Jackson Heights, N. Y., assignors, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,031,104. **Knitting.** N. Gilpin, Riverside, Ill.

Dominion of Canada

355,391. **Hose.** Whitehead Bros. Rubber Co., Trenton, assignee of F. B. Williamson, Jr., Elizabeth, both in N. J., U. S. A.

355,452. **Elastic Fabric.** T. L. Shepherd, London, England.

355,486. **Molded Porous Product.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of E. W. Madge and F. J. Payne, co-inventors, both of Birmingham, England.

355,507. **Sand Blasting Stencil.** Minnesota Mining & Mfg. Co., assignee of A. J. Wartha, both of St. Paul, Minn., U. S. A.

355,679. **Rubber Dispersion Concentration.** Vultex Corp. of America, Cambridge, assignee of H. B. Townsend, Belmont, both in Mass., U. S. A.

355,768. **Surfacing Golf Balls.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of D. F. Twiss and F. A. Jones, co-inventors, both of Birmingham, England.

355,769. **Ball.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of S. G. Ball and E. W. Allen, co-inventors, both of Birmingham, England.

355,770. **Surfacing Balls.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of D. F. Twiss and F. A. Jones, co-inventors, both of Birmingham, England.

United Kingdom

436,539. **Lasting Footwear.** British United Shoe Machinery Co., Ltd., Leicester. (United Shoe Machinery Corp., Boston, Mass., U. S. A.)

436,774. **Attaching Rubber to Other Surfaces.** Greengate & Irwell Rubber Co., Ltd., and L. White, both of Salford.

436,965. **Rubber Article.** J. A. Howard, London.

437,286. **Braid.** J. E. C. Bongrand, Paris, France.

437,526. **Elastic Fibrous Sheet Material.** United Cotton Products Co., Fall River, Mass., U. S. A.

Germany

625,208. **Teething Rings.** J. Fromm, Berlin-Schlachtensee.

626,204. **Joining Fabric and Rubber for Gas Masks.** Dragerwerk Heinr. und Bernh. Drager, Lubeck.

626,780. **Dental Plates.** O. Schweigert, Pforzheim.

CHEMICAL

United States

2,028,349. **Lubricant.** M. Pier, Heidelberg, and F. Christmann, both of Ludwigshafen a. Rhine, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.

2,028,397. **Rubber Dispersion.** M. H. Kliefoth, assignor to C. F. Burgess Laboratories, Inc., both of Madison, Wis.

2,029,008. **Method of Masking.** R. A. Wilson, Chicago, Ill., assignor of ½ to G. A. Chritton.

2,029,410. **Chemical Product.** W. H. Carothers, Fairville, Pa., and A. M. Collins and J. E. Kirby, assignors to E. I. du Pont de Nemours & Co., all of Wilmington, Del.

2,029,588. **Film Forming Composition.** L. Rosenthal, Leverkusen-Wiesdorf, and R. Hebermehl, Cologne-Deutz, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.

2,029,617. **Sponge Rubber.** G. S. Hiers, Cynwyd, assignor to Collins & Aikman Corp., Philadelphia, both in Pa.

2,029,642. **Accelerator.** W. L. Semon, Silver Lake Village, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,030,222. **Stable Aqueous Dispersion.** E. B. Newton, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,030,633. **Adhesive Composition.** H. E. Holcomb, Stratford, Conn., assignor to Johns-Manville Corp., New York, N. Y.

2,030,892. **Match Manufacturing.** M. G. Pelipetz, assignor of ½ to P. L. Doodchenko, both of New York, N. Y.

2,031,529. **Accelerator.** E. Elbel and A. Kirstahler, assignors to Henkel & Cie., Gesellschaft mit beschränkter Haftung, all of Dusseldorf, Germany.

Dominion of Canada

355,483. **Rubber and Plastic Composition.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of D. F. Twiss and J. A. Wilson, co-inventors, both of Birmingham, England.

355,517. **Carbon Black Manufacture.** Shell Development Co., San Francisco, Calif., assignee of R. H. Brownlee, Pittsburgh, Pa., both in the U. S. A.

355,623. **Plastic and Elastic Material.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of S. D. Shinkle, Passaic, N. J., U. S. A.

355,627. **Gutta Percha Article.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of D. F. Twiss and F. A. Jones, co-inventors, both of Birmingham, England.

355,628. **Synthetic Rubber.** E. I. du Pont de Nemours & Co., assignee of A. M. Collins, both of Wilmington, Del., U. S. A.

United Kingdom

436,536. **Latex Concentration.** Metallges. A. G., Frankfurt a. M., Germany.

436,553. **Match Manufacture.** O. F. Wyss, Zurich, Switzerland.

436,686. **Bituminous Composition.** Callender's Cable & Construction Co., Ltd., London, and S. Beckinsale and H. C. Page, both of Belvedere.

436,878. **Waterproofing Paper.** J. Knaggs and Portals, Ltd., both of Whitchurch.

437,013. **Rubber Composition.** Metallges. A. G., Frankfurt a. M., Germany.

437,083. **Coating Composition.** L. J. Smith, Wollstonecroft, and B. N. Black, Sydney, both in Australia.

437,283. **Rubber Color.** I. G. Farbenindustrie A. G., Frankfurt a. M., Germany.

437,302. **Chlorinated Rubber Solution.** I. G. Farbenindustrie A. G., Frankfurt a. M., Germany.

437,304. **Halogenated Rubber.** Wingfoot Corp., Akron, O., U. S. A.

437,399. **Reclaiming Rubber.** G. E. Heyl, London.

437,400. **Active Carbon.** G. Caroile and E. Gardiol (trading as I.A.C. Industria Articoli Caoutchouc), both of Tivoli, Italy.

437,431. **Accelerator.** Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij, The Hague, Holland, assignee of L. Rosenstein, San Francisco, Calif., U. S. A.

437,590. **Accelerator.** J. Y. Johnson, London. (I. G. Farbenindustrie A. G., Frankfurt a. M., Germany.)

437,647. **Carbon Black Granules.** H. E. Potts, Liverpool. (United Carbon Co., Charleston, W. Va., U. S. A.)

437,655. **Rubber Composition.** S. Perez, London, assignee of A. Müller, Berlin, Germany.

437,758. **Concentrating Latex.** Rubber Producers Research Association, G. Martin, W. S. Davey, and H. C. Baker, all of London.

438,452. **Antioxidant.** E. I. du Pont de Nemours & Co., Wilmington, Del., U. S. A.

Germany

624,298. **Method of Thickening Latex without Coagulation.** United States Rubber Co., New York, N. Y., U. S. A. Represented by C. and E. Wiegand, both of Berlin.

625,400. **Rubber Compounds with Leather Waste as Filler.** P. Meyersberg and G. Wolf, both of Bratislava, Czechoslovakia. Represented by C. B. E. von Bornegg, Berlin.

625,528. **Dry Chlorinated Rubber.** Deutsche Gold-und Silber-Scheideanstalt vormals Roessler, Frankfurt a.M.

626,082. **Road Surfacing Material.** Dunlop Rubber Co., Ltd., London, England, and Anode Rubber Co., Ltd., St. Peter's Port, Channel Islands. Represented by C. Wiegand, Berlin.

626,470. **Hot-curing Rubber Panties.** W. Muller, Hannover.

GENERAL

United States

19,847 (Reissue). **Antisqueak Strip.** R. W. Springer, Detroit, Mich.

2,028,135. **Tire.** E. G. Budd, assignor to Edward G. Budd Mfg. Co., both of Philadelphia, Pa.

2,028,165. **Tire.** R. C. Pierce, assignor to National-Standard Co., both of Niles, Mich.

2,028,178. **Cable.** R. J. Wiseman, Paterson, assignor to Okonite Co., Passaic, both in N. J.

2,028,238. **Colostomy Girdle and Support.** F. M. Olver, Youngstown, O.

2,028,358. **Escalator Handrail.** H. W. Shonnard, Montclair, N. J.

2,028,367. **Electric Connecter.** H. H. Wermine, Villa Park, assignor to Belden Mfg. Co., Chicago, both in Ill.

2,028,375. **Electric Plug Connecter.** G. E. Andre, Richmond, Ind., assignor to Belden Mfg. Co., Chicago, Ill.

2,028,398. **Belt Connecter.** E. H. Kremer, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.

2,028,401. **Railway Line.** M. A. Loré, Blackpool, England.

2,028,454. **Bathtub Cover.** A. M. Johnson, St. Joseph, Mo.

2,028,549. 2,028,550, and 2,028,551. **Mounting.** H. C. Lord, Erie, Pa.

2,028,588. **Comb.** O. B. Carson, Scarsdale, assignor to American Hard Rubber Co., New York, both in N. Y.

2,028,592. **Valve Stem.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Co., Cleveland, both in O.

2,028,601. **Tire and Rim.** E. E. Hall, Chicago, Ill.

2,028,640. **Suction Cup.** L. Zaiger, Lynn, Mass.

2,028,702. **Wheel.** J. E. Hale, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,028,707. **Rail Car Wheel.** C. D. Smith, Fairlawn, assignor to Firestone Tire & Rubber Co., Akron, both in O.

2,028,709, 2,028,710, 2,028,711, and 2,028,712. **Printing Plate.** H. Swan, Upper Montclair, and S. Higgins, Verona, both in N. J., assignors to Bakelite Corp., New York, N. Y.

2,028,731. **Loom Protection Mechanism.** C. D. Brown, assignor to Draper Corp., both of Hopedale, Mass.

2,028,746. **Rubber Footwear Knitted Lining.** R. M. Holden and J. F. Roberts, assignors to Holden Knitting Co., all of Worcester, Mass.

2,028,797. **Toy.** L. D. Miller, assignor to Lee-Tex Rubber Products Corp., both of Chicago, Ill.

2,028,865. **Massager.** F. D. Forsyth, Athens, O., and D. A. Nevin, Waynesboro, Pa.

2,028,872. **Pile Fabric.** W. D. Kellogg, assignor to Mohawk Carpet Mills, Inc., both of Amsterdam, N. Y.

2,028,916. **Glass Laminating Apparatus.** W. Owen, Pittsburgh, Pa., assignor to Pittsburgh Plate Glass Co., a corporation of Pa.

2,028,928. **Laminated Glass Apparatus.** J. H. Sherts, Tarentum, Pa., assignor to Duplate Corp., a corporation of Del.

2,028,942. **Electrical Entrance Plug.** R. H. Money, assignor to Crosley Radio Corp., both of Cincinnati, O.

2,028,984. **Eyecup.** C. D. Lukens, St. Louis, Mo.

2,029,000. **Eraser.** E. A. Sell, Belleville, assignor to Joseph Dixon Crucible Co., Jersey City, both in N. J.

2,029,005. **Knitting Needle Stitch Holder.** H. A. Webber, Coronado, Calif.

2,029,064. **Carcass Scraper.** G. N. Edwards, assignor to Ohio Rubber Co., both of Willoughby, O.

2,029,132. **Wheel Balance.** O. R. Skelton, Grosse Pointe Farms, assignor to Chrysler Corp., Detroit, both in Mich.

2,029,324. **Shoe Bottom Pressure Applier.** F. Kennison, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,029,366. **Solid Lubricating Material.** H. D. Geyer, Dayton, O., assignor, by mesne assignments, to General Motors Corp., Detroit, Mich.

2,029,367. **Composite Rubber Piston.** H. D. Geyer, Dayton, O., assignor to General Motors Corp., Detroit, Mich.

2,029,370. **Cushioning Structure.** C. H. Heldenbrand, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,029,381. **Endless Belt.** A. B. Merrill and G. H. Stewart, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,029,409. **Arch Support Shoe.** L. C. Brand, Ottawa, Ill.

2,029,483. **Water Syringe.** J. J. Holland, Parkesburg, Pa.

2,029,546. **Insulated Conductor.** R. A. Schatzel, Rome, assignor to General Cable Corp., New York, both in N. Y.

2,029,564. **Wearing Apparel.** W. F. Gowdy, assignor to Archer Rubber Co., both of Milford, Mass.

2,029,630. **Water Pipe.** S. McMichael, Round Hill, assignor, by mesne assignments, of ⅛ to R. C. Smith, Berryville, both in Va.

2,029,682. **Dental Manikin.** M. O. Squires, San Francisco, Calif.

2,029,711. **Door Check.** P. E. Frantz, assignor to Apex Electrical Mfg. Co., both of Cleveland, O.

2,029,784. **Watertight Watchcase.** E. Morf, La Chaux-de-Fonds, Switzerland.

2,029,845. **Refrigerator Cabinet Gasket.** E. W. Vars, Erie, Pa., assignor to General Electric Co., a corporation of N. Y.

2,029,855. **Drinking Vessel Washer.** C. Chambers, Shirley, England.

2,029,880. **Elastic Fabric.** G. W. Lindley, Philadelphia, Pa.

2,029,912. **Sphygmomanometer Bandage.** F. Cossor, London, England.

2,029,945. **Denture Valve.** M. M. Rubinstein, Jersey City, N. J.

2,029,997. **Condiment Holder.** L. I. Gaddy, Panama City, Fla.

2,030,018. **Apparel Belt.** J. Mouilbau, assignor to Société du Caoutchouc Manufacturé, both of Paris, France.

2,030,215. **Tire.** F. K. Kreutz, San Diego, Calif.

2,030,224. **Hypogastric Supporter.** B. F. Pease, Silver Lake, O.

2,030,243. **Tire.** G. F. A. Corts, Goteborg, Sweden.

2,030,255. **Bumper Guard.** F. C. Howard, assignor to American Automatic Devices Co., both of Chicago, Ill.

2,030,302. **Top.** W. L. Jones, Kenmore, N. Y.

2,030,311. **Road and Rail Vehicle.** K. Y. Messick, Clarendon, Va.

2,030,358. **Feet Treater.** H. J. Dorrance, Pittsburgh, Pa.

2,030,366 and 2,030,367. **Vacuum Cleaner.** O. Grave, Berlin, Germany.

2,030,452. **Fountain Pen.** R. B. Kingman, Orange, N. J., assignor, by mesne assignments, to Camel Pen Co., a corporation of N. J.

2,030,494. **Cleaner.** B. M. and C. E. Bireley, both of Hollywood, Calif.

2,030,545. **Sole.** H. Schulze, Leipzig, Germany.

2,030,592 and 2,030,593. **Tire Inflater.** O. W. Hosking, Monroe, N. Y.

2,030,623. **Highway Post.** O. D. Eggleston, Carlton, Kan.

2,030,649. **Furniture Leg Shoe.** R. E. Miller, Bronxville, N. Y.

2,030,699. **Furniture Leg Slide.** W. F. Herold, assignor to Bassick Co., both of Bridgeport, Conn.

2,030,750. **Resilient Joint.** J. W. Leighton, Port Huron, Mich.

2,030,788. **Resilient Universal Joint.** H. D. Geyer, Dayton, O., assignor, by mesne assignments, to General Motors Corp., Detroit, Mich.

2,030,826. **Undergarment.** H. Schoebel, Hempstead Gardens, L. I., assignor to Model Brassiere Co., Inc., Brooklyn, both in N. Y.

2,030,856. **Plug Connecter.** H. P. Dillig, Pittsburgh, Pa.

2,030,874. **Panel Mounting.** L. G. Hunter, Flushing, N. Y.

2,030,911. **Sponge.** C. R. C. Borden, Brookline, Mass.

2,030,915. **Shoe Bottom Pressure Pad.** S. J. Finn, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,031,022. **Combination Garment.** H. Wipperman, assignor to H. W. Gossard Co., both of Chicago, Ill.

2,031,025. **Hydrometer Syringe.** F. Altmayer, assignor to Willard Storage Battery Co., both of Cleveland, O.

2,031,196. **Sole.** F. Vicente, Habana, Cuba.

2,031,197. **Hot Water Bag Cover and Stand.** H. E. Weaver, Yonkers, N. Y.

2,031,217. **Bumper Guard.** O. Kernspecht, assignor to Variety Machine & Stamping Co., both of Cleveland, O.

2,031,240. **Toy.** W. J. Van Deest, Los Angeles, Calif.

2,031,257. **Emergency Wheel.** H. J. Finke, Jr., Etna, Pa.

2,031,297. **Windshield Wiper.** J. W. Anderson, Gary, Ind.

2,031,343. **Fountain Pen.** I. D. Tefft, assignor to Parker Pen Co., both of Janesville, Wis.

2,031,375. **Elastic Fabric Noncreep Strands.** S. C. Lilley, assignor to American Mills Co., both of Hamden, Conn.

2,031,378. **Battery Terminal Post.** H. W. Lormor, Cleveland Heights, assignor to Willard Storage Battery Co., Cleveland, both in O.

2,031,394. **Plant Marker.** N. C. Vander Kraats, New Brunswick, N. J.

2,031,491. **Sole Attaching Apparatus.** J. T. Lancaster, Newton, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

2,031,510. **Arch and Heel Support.** E. M. Stewart and S. Shagrin, both of Youngstown, O.

2,031,511. **Heel.** P. B. Sullivan, Randolph, Mass.

2,031,565. **Power Transmitting Belt.** E. D. Kramp, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

Dominion of Canada

355,257. **Body Protector.** J. J. Cartledge, Guelph, Ont.

355,326. **Belt Connecter.** Dayton Rubber Mfg. Co., assignee of E. H. Kremer, both of Dayton, O., U. S. A.

355,381. **Hide Treater.** Tanning Process Co., Boston, assignee of J. H. Connor, Newton, both in Mass., U. S. A.

355,393. **Electric Plug.** L. C. Ouellet, inventor, and E. A Martin, assignee of 25% of the interest, both of Edmundston, N. B.

355,484. **Tire.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of E. W. Madge, F. B. Jones, and D. Parkinson, co-inventors, all of Birmingham, England.

355,544. **Printer's Blanket.** Dayton Rubber Mfg. Co., assignee of A. L. Freedlander, both of Dayton, O., U. S. A.

355,574. **Motor Vehicle.** J. V. Martin, Garden City, L. I., N. Y., U. S. A.

355,582. **Wiper Blade.** P. E. Schleicher, Gary, Ind., U. S. A.

355,584. **Weatherstrip.** J. J. Sheppard, Flint, Mich., U. S. A.

355,622. **Valve Stem.** Dill Mfg. Co., Cleveland, assignee of J. C. Crowley, Cleveland Heights, both in O., U. S. A.

355,644. **Printer's Blanket.** International Latex Processes, Ltd., St. Peter's

Port, Channel Islands, assignee of H. deB. Rice, Barrington, R. I., U. S. A.

355,727. **Collapsible Perforated Bed.** N. Menard, Notre Dame du Bon Conseil, P. Q.

355,779. **Flexible Valve Stem.** Goodyear Tire & Rubber Co., assignee of B. C. Eberhard, both of Akron, O., U. S. A.

United Kingdom

435,392. **Engine Mounting.** I. A. Leslie, Evesham.

435,879. **Aircraft Engine Support.** Armstrong Siddeley Motors, Ltd., H. N. Wylie, and A. R. B. Gay, all of Coventry.

435,928. **Ignition Tester.** F. N. Dimond-Hogg, Plymouth.

436,336. **Raft.** R. Johnson, London.

436,548. **Windscreen Cleaner.** H. S. Hopcraft, Elstree.

436,643. **Flooring.** Soc. Italiana Pirelli, Milan, Italy.

436,761. **Battery.** Chloride Electrical Storage Co., Ltd., and H. Dean, both of Clifton Junction.

436,767. **Hair Curler.** R. M. McFadden, Glendale, Calif., U. S. A.

436,778. **Motorcar Bonnet Fastening.** N. G. N. Etherington, Newcastle-on-Tyne.

436,872. **Crop Sprayer.** E. H., D. T., E. J., and J. T. Gratton, all of Boston.

436,930. **Wearing Apparel.** E. Spelta, Turin, Italy.

436,933. **Lay Figure.** J. F. Wirz, Highgate Hill, Australia.

436,966. **Shoe Buffer.** S. Harper and E. Lloyd, both of Southport.

436,978. **Umbrella Stand.** F. Sage & Co., Ltd., and B. Bosker, both of London.

436,980. **Railway Vehicle Bogie.** E.M.B. Co., Ltd., G. N. Cadbury, and S. Smith, all of W. Bromwich.

436,994. **Football.** J. Pargeter, London.

437,009. **Refrigerator.** J. Farago, Budapest, Hungary.

437,041. **Cable.** Macintosh Cable Co., Ltd., and A. Sargent, both of Derby.

437,108. **Tire Pressure Regulator.** Tecalemit, Ltd., and R. A. Chalmers, both of Brentford.

437,113. **Match Receptacle.** B. J. Wakefield-Pitt, Redditch.

437,114. **Flexible Unjointed Hinge.** Andre (Silentbloc), Ltd., and S. W. Jelley, both of London.

437,183. **Engine Mounting.** I. A. Leslie, Evesham.

437,247. **Radio Active Preparation.** Radium-Chemie A. G., Frankfurt a. M., Germany.

437,253. **Surgical Dressing.** J. Huerre, Levallois-Perret, France.

437,259. **Foot Deformity Corrector.** M. Jungmann, Vienna, Austria.

437,261. **Mop.** Electrolux, Ltd., Luton, assignee of Aktiebolaget Elektrolux, Stockholm, Sweden.

437,318. **Hose Pipe.** F. Reddaway & Co., Ltd., and W. G. Pemberton, both of Salford.

437,357. **Coated Fur Hide.** N. Fried, Budapest, Hungary.

437,381. **Pneumatic Sucker Fastening.** S. A. Marples, Chipstead.

437,395. **Motor Vehicle Fuel Tank.** Morris Motors, Ltd., and S. J. Westby, both of Oxford.

437,396. **Hose Pipe.** L. Szurgent, Vienna, Austria.

437,463. **Gate Valve.** British Metallic Packings Co. (1933), Ltd., Sidcup, and R. E. Smart, Westminster.

437,525. **Cable.** Macintosh Cable Co., Ltd., and A. Sargent, both of Derby.

437,533. **Hydraulic Power Transmission.** W. L. Avery, Bishop's Stortford.

437,553. **Compound Fabric.** Fabbriche Riunite Industria Gomma Torino W. Martiny Industria Gomma-Spiga-Sabit-Life, Turin, Italy.

437,554. **Embroidery.** L. Falk, London.

437,648. **Mariners' Compass Mounting.** A. J. Hughes, Chigwell Row, and H. Hughes & Son, Ltd., London.

437,707. **Battery.** Compagnie Generale D'Electricite, Paris, France.

437,716. **Trawling.** J. Chant, Plymstock.

437,783. **Phonographic Reproducer.** Electrical Research Products, Inc., assignee of C. F. Wiebusch, both of New York, N. Y., U. S. A.

437,822. **Feeding Bottle.** R. McClay, Belfast, Ireland.

437,871. **Manicure Appliance.** A. Hunter, Berlin, Germany.

437,917. **Cable.** Siemens & Halske A. G., Berlin, Germany.

437,948. **Battery.** A. N. Hazlehurst, Iver Heath.

Germany

625,056. **Inner Tube.** L. Galindo, Santiago, Chile. Represented by S. Hauser, Berlin.

625,334. **Self-Sealing Inner Tube.** Continental Gummi-Werke A.G., Hannover.

625,615. **Air Bag.** Deutsche Dunlop Gummi-Co. A.G., Hanau.

625,805. **Tread Patch.** H. Dresing, Wesermunde-Lehe.

626,160. **Twin Tires for Trucks.** Continental Gummi-Werke A.G., Hannover.

626,766. **Pneumatic Tire.** Macmillan Tire Trust, Ltd., London, England. Represented by E. Jourdan and W. Paap, both of Berlin.

TRADE MARKS

United States

331,736. Silhouette of knight's helmet and the words: **"Reserve Strength Bartex Liquid Latex."** Balloons. Barr Rubber Products Co., Sandusky, O.

331,737. **Tumballoons.** Novelty balloons. Barr Rubber Products Co., Sandusky, O.

331,795. **Key-Tee.** Key retainers. J. J. Sindler, Malden, Mass.

331,830. Circle containing the words: **"Hi-Mileage Safety Tread."** Tread stock for tire retreading. W. J. Jarratt, doing business as Safety Vulcanizer Co., Chicago, Ill.

331,894. **Royalite.** Abrasive wheels. United States Rubber Co., New York, N. Y.

332,027. **Zephyr.** Golf balls. United State Rubber Co., New York, N. Y.

332,049. **Elasticol.** Elastic impression dental material. Goldsmith Bros. Smelting & Refining Co., Chicago, Ill.

332,055. **Free-Cube.** Refrigerator ice trays. Inland Mfg. Co., Dayton, O.

332,065. **Laceless.** Ball. P. Goldsmith Sons Co., Cincinnati, O.

332,183. **Varsity Girl.** Sanitary belts. J. Goodman, New York, N. Y.

332,270. **Tempered Rubber.** Footwear. United States Rubber Products, Inc., New York, N. Y.

332,293. **Gaynite.** Women's wear including corsets and brassieres. Sussberg & Feinberg, Inc., New York, N. Y.

332,295. **"Sweet-Music."** Corsets, brassieres, etc. Maiden Form Brassiere Co., Inc., New York, N. Y.

332,334. Representation of a pair of wings and the words: **"Fleet-Air Health Shoe."** Footwear. Eby Shoe Corp., Ephrata, Pa.

332,353. Cross containing crosswise and lengthwise the word: **"Utility."** Aprons and bathing caps. Rand Rubber Co., Inc., Brooklyn, N. Y.

332,369. **Kooleez.** Baby pants. International Latex Corp., Rochester, N. Y.

332,385. **Inflation.** Brassieres and foundation garments. Formfit Co., Chicago, Ill.

332,389. Caricature of a man with the body a button and the word: **"Buttons."** Footwear. Shoecraft, Inc., New York, N. Y.

332,390. Streak and the words: **"Blue Streak."** Basketball shoes. A. G. Spalding & Bros., New York, N. Y.

332,392. **Kedettes.** Footwear. United States Rubber Products, Inc., New York, N. Y.

332,395. **Erectitude.** Footwear, corsets, brassieres, garters, garment supporters, etc. L. Malmstead, Worcester, Mass.

332,400. Cross containing crosswise and lengthwise the word: **"Utility."** Dress shields. Rand Rubber Co., Inc., Brooklyn, N. Y.

332,413. **"Magicia."** Corsets, brassieres, etc. Soc. Cadolle Freres, Paris, France.

332,416. Representation of a rabbit in a top hat above the word: **"Magiklub."** Boys' wear including raincoats and footwear. J. Rosenbloom, doing business as National Boys Magiklubs, assignor to National Boys Magiklubs, Inc., both of New York, N. Y.

332,440. **Recovery.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.

332,443. **Ambassador.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.

332,444. **Fiesta.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.

332,516. **"Trainers."** Baby pants. I. B. Kleinert Rubber Co., New York, N. Y.

332,522. **Rubco.** Assembled electrical conductors. United States Rubber Products, Inc., New York, N. Y.

332,549. **Turf Rider.** Golf balls and clubs, General Sports, Inc., Chicago, Ill.

332,550. **Sweepstakes.** Golf balls and clubs, General Sports, Inc., Chicago, Ill.

332,584. **The Acme.** Rubber covered horseshoes. L. Ziegler, New York, N. Y.

332,598. Representation of a windshield being wiped, containing the word: **"Sleetex."** Windshield wiper blades. Sleetex Co., Inc., New York, N. Y.

332,616. Oval containing the words: **"'Works When You Walk.' Calistile."** Footwear. L. Feder, Los Angeles, Calif.

332,623. **El-Sixty.** Accelerators. Rubber Service Laboratories Co., Akron, O.

332,624. **Perflectol.** Antioxidants. Rubber Service Laboratories Co., Akron, O.

332,631. **Hawthorne.** Footwear, Sears, Roebuck & Co., Chicago, Ill.

332,640. **Ruff Neck.** Soles. Quabaug Rubber Co., N. Brookfield, Mass.

332,665. **"Golddust."** Dental rubber. Atlantic Rubber Mfg. Corp., New York, N. Y.

332,693. **AZO.** Zinc oxide. American Zinc Sales Co., St. Louis, Mo.

332,694. Letters: **"AZO"** above an oval containing the letters: **"ZZZ."** Zinc oxide. American Zinc Sales Co., St. Louis, Mo.

332,696. **Araline.** Liquid rubber coating compound. Arabol Mfg. Co., New York, N. Y.

332,803. **Society Brand.** Tires. B. Rubens, Rochester, N. Y.

332,828. **Vistanex.** Compounding and impregnating agent. Standard Oil Development Co., Linden, N. J.

332,863. Word: **"Tru-rip"** formed of representations of electrical conductors. Insulated electrical conductors. Whitney Blake Co., Hamden, Conn.

332,864. **Klozure.** Packings. Garlock Packing Co., Palmyra, N. Y.

332,893. Representation of a small eagle in flight to the right of a larger one grasping a pennant in his claws. Tires and inner tubes. Goodyear Tire & Rubber Co., Akron, O.

332,894. Representation of a large and a small eagle in flight, with the former grasping a pennant in his claws. Tires and inner tubes. Goodyear Tire & Rubber Co., Akron, O.

332,895. Representation of a large and a small eagle in flight, with the former grasping a pennant in his claws, and below, the words: **"Double Eagle."** Tires and inner tubes. Goodyear Tire & Rubber Co., Akron, O.

332,896. Representation of a small eagle in flight to the right of a larger one grasping a pennant in his claws, and below, the words: **"Double Eagle."** Tires and inner tubes. Goodyear Tire & Rubber Co., Akron, O.

332,924. Bow containing the letters: "I D L" between the words: **"Beau Ideal."** Elastic fabric. Ideal Linen Mesh Co., Poughkeepsie, N. Y.

332,929. **British Flyer.** Golf balls. E. Ormen, assignor to Golf Ball, Inc., both of Chicago, Ill.

332,951. Representation of a section of a bridge between the words: **"All Flex."** Tires, inner tubes, and flaps. Associated Rubber Corp., N. Y., N. Y.

332,959. **Vogue Lifts-U.** Corsets, brassieres, etc. Vogue Mfg. Co., Newark, N. J.

Financial

(*Continued from page* 55)

$1,758,232 in 1934, an increase of 82.4%. Payrolls were 38.1% higher in 1935 than for 1934. The average number of employes during 1935 was 14,390, compared with 12,047 for 1934. Average hourly rates for factory workers are now higher than in 1929. The higher labor costs were not reflected in the selling prices.

U. S. Rubber Reclaiming Co., Inc., 500 Fifth Ave., New York, N. Y. For 1935: net profit, after depreciation, federal taxes, and other charges, $102,057, equal to $1.35 each on 76,425 shares of $25-par 8% cumulative prior preference stock. Accumulated unpaid dividends on this issue amount to $840,675, or $11 a share, and on Class A cumulative preferred $295,960, or $8.25 a share.

United States Rubber Co., 1790 Broadway, New York, N. Y., and subsidiaries. For 1935: net sales, $127,793,615 after deduction of all returns, discounts, sales and excise taxes, transportation and other allowances. This constituted an increase of $22,316,743 or 21% over the year 1934. The consolidated statement of operations does not include sales of tires or other products by affiliated companies whose capital stock is not wholly owned by the company. Profit from operations for the year, before deduction of interest, depreciation, and income taxes was $17,856,232. After deduction of interest of $3,459,784, depreciation of $5,581,878 and income taxes of $1,535,959, the profit was $7,278,611. Other charges, including adjustments of property values, provision for contingencies, adjustments of values of miscellaneous securities, and a reserve to cover mortgages of doubtful value, reduced the profit to $1,731,378. To this was added a dividend of $500,000 from U. S. Rubber Plantations, Inc., resulting in a profit for the year of $2,231,378.

The increase in surplus of the plantations companies was $467,695. The increase in net worth of securities of affiliated companies was $666,819. The total increase in equities held by the stockholders of the United States Rubber Co. was $3,365,892 for the year. Total current assets were $62,545,527 at the close of the year, including $11,141,828 in cash. Total current and accrued liabilities were $15,266,616. Net quick assets were $47,278,911 on December 31, 1935, against $43,565,188 on December 31, 1934, an increase of $3,713,723. The ratio of current assets to current liabilities was 4.1 to 1. There was a reduction of $10,261,683 in total outstanding funded and long term indebtedness during the year. The net book value of all properties, plants, and equipment was $66,941,851 on December 31, 1935, a reduction of $6,804,989 for the year.

United States Rubber Plantations, Inc. For 1935: profit of $2,631,788 before provision for depreciation and amortization of $1,664,093, which resulted in a net profit of $967,695 for the year, compared with a profit of $1,735,842 for 1934. A dividend of $500,000 was declared, leaving a credit to surplus of $467,695. The sharp drop in profits was due to the reduction in shipments from 50,872,000 pounds in 1934 to 40,004,000 pounds in 1935. Governmental restriction of shipments based on standard production of rubber was increased from 25% in the first quarter of the year to 40% in the last quarter. The average selling price was approximately the same as in 1934, but the average cost of production was higher by reason of the greatly curtailed shipments. Production for the year was 42,054,000 pounds, which was in excess of shipments by 2,050,000 pounds for which export rights were not available. Approximately 99,000 acres are planted and 90,000 have reached maturity. 75,180 acres were tapped, with an average yield per acre of 559 pounds.

New Incorporations

The Alling-Waters Rubber Co., 131 Main St., Paterson, N. J. Capital 250 shares, no par value. J. Waters, 87 Seventeenth Ave., Paterson; C. E. and K. B. Alling, both of Stamford, Conn. Manufacture various kinds of rubber goods.

Baxter Rubber Co., 163 Mulberry St., Newark, N. J. Capital 1,000 shares, no par value. C. E., Sr., C. E., Jr., and C. M. Baxter, all of 9 Orchard Rd., Maplewood. Manufacture rubber goods.

De Luxe Rubber Co., Columbus, O. Capital $6,250. J. B. Morgan, E. M. and H. J. Rothwell, and J. P. Riddle.

Ezy Grip Rubber Co., Santa Fe, N. M. Capital $10,000. F. P. Jackson, B. Prior, C. J. Deyter, J. W. Beivy, and C. Rogers, all of Artesia.

Linden Rubber Roll Co., 46 Bayard St., New Brunswick, N. J. Capital 2,500 shares at $10 a share. J. B. Molineux, 31 Carlton Rd., Metuchen; A. D. Watson, 324 Highland Ave., Highland Pk.; and W. S. Greacen, 190 College Ave., New Brunswick. Manufacture various kinds of rubber.

Needham Rubber Co., Needham, Mass. Capital 1,000 shares, no par value. A. L. and D. G. Feinburg, both of Newton; E. L. Parent, Stoughton.

Malayan Notes

(*Continued from page* 66)

Merlimau Pegoh, Ltd., has acquired practically the whole of the issued share capital of Ayer Tengah Rubber Estates, Ltd. The latter company has 901 acres of mature rubber.

Total rubber exports from Malaya in 1935 came to 370,580 tons, 7,430 tons above the permissible exportable amount for the year. There was a carry-over from 1934 of 11,326 tons, now reduced to 4,896 tons.

In a letter to the *Straits Times* the following official figures are quoted to show that the brunt of restriction is being borne by the smallholders

	Tons	
Year	Estates under 100 Acres	Estates over 100 Acres
1930	215,089	236,775
1931	195,422	239,435
1932	177,030	240,107
1933	220,639	240,104
1934	217,003	262,363
1935	135,555	242,942

Special attention is called to the 1933 and 1934 figures of small holdings as compared with 1935 figures under restriction, also to the fact that there is no decrease in production of large estates from the 1930 figure.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

ENGINEER ON MECHANICAL DEVELOPMENT, METHODS AND maintenance, hard and soft rubber in mechanicals, thread and sundries. Over 15 years of successful supervision in rubber factories. Progressive, resourceful, employed, married. Address Box No. 632, care of INDIA RUBBER WORLD.

WANTED: POSITION AS FOREMAN IN MILL ROOM AND CALender. Have 20 years' practical experience in mechanicals, tires, and footwear. Reference if desired. Address Box No. 634, care of INDIA RUBBER WORLD.

FACTORY MANAGER, WITH YEARS OF EXPERIENCE IN THE production of dental rubber, compounding, sponge rubber, tires, tubes, press goods and mechanicals. Also experienced with calenders, mills, presses, etc. Address Box No. 635, care of INDIA RUBBER WORLD.

FACTORY EXECUTIVE, QUALIFIED BY MANY YEARS' EXPERIence with recognized rubber manufacturers producing soft mechanicals, hard rubber, sundries, and plastics. Skilled in compounding, purchasing, production, development, plant, property and cost accounting. Address Box No. 636, care of INDIA RUBBER WORLD.

MOLDED GOODS AND DRUGGISTS' SUNDRIES: MAN CAPABLE of taking complete charge of manufacturing operations, from mill room to finished product. Can handle labor effectively, and materials economically. Thorough cost, technical, and manufacturing knowledge. College graduate, now employed. Continuously employed in rubber manufacturing for past eighteen years. Offers high-grade services for a salary of considerable inducement to an alert, progressive management interested in greater profits. Address Box No. 637, care of INDIA RUBBER WORLD.

RUBBER CHEMIST: THREE YEARS' EXPERIENCE, AT PRESENT employed in the manufacture of mechanicals, proofing, and cements. Field experience. 27, single. Address Box No. 640, care of INDIA RUBBER WORLD.

SITUATIONS WANTED—Continued

FACTORY MANAGER DESIRES FACTORY MANAGER'S OR superintendent's position. Versed in practical compounding, mixing and vulcanization of hard rubber products, battery containers, vent caps, covers, electrically inserted and miscellaneous products, soft rubber mechanical molded products. Can supervise the laying out, setting up, and maintenance of mills, tube machines, calenders, presses, temperature controls, hydraulic pumps, air compressors and miscellaneous finishing machines. Can obtain the uttermost efficiency from water tube or H-R-T boilers. Address Box No. 641, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

WANTED: SALESMAN, CAPABLE OF ACTING AS SALES MANager for the sale of rubber tile flooring, mechanical rubber goods, etc. Give experience, references, and salary expected. Address Box No. 630, care of INDIA RUBBER WORLD.

EXPERIENCED RUBBER COMPOUNDER

Capable of doing development work in the compounding of mechanical goods. This vacancy is with one of the leading rubber companies located in Central Ohio and is a real opportunity for the right man. In reply state age, training, experience, salary expected, and present employment. Address Box No. 639, care of INDIA RUBBER WORLD.

REQUIRED:

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2. **RUBBER THREAD SPECIALIST.**

Applications should include full particulars of past experience, photograph and salary required to

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Water—Fire—Air—Steam

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269—light **271-S—medium** **258—dark**

Write for samples

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Easton, Pa.

GEO. S. MEPHAM & CO.
East St. Louis, Ill.

(Advertisements continued on page 87)

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Imports* Tons	U. S. Consumption Tons	U. S. Mfgrs., Importers, Dealers, Etc.† Tons	U. S. Stocks Afloat† Tons	U. K.—Public Warehouses, London, Liverpool†‡ Tons	Singapore and Penang Dealers and Port Stocks†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1933	411,615	401,000	365,000	55,606	86,505	44,884	853,100	798,900	616,370
1934	469,484	453,223	355,000	47,644	134,927	62,142	1,016,600	959,400	678,994
1935									
January ...	42,059	47,103	348,931	42,066	148,337	59,609	79,545	89,216	671,954
February ..	35,383	43,187	339,335	42,969	155,727	57,586	75,508	90,494	657,717
March	44,041	42,620	338,700	44,485	162,012	55,100	66,671	88,112	652,659
April	43,545	44,714	334,954	37,651	165,064	48,827	76,534	80,261	652,471
May	26,866	41,568	319,281	44,375	167,745	54,740	77,940	71,543	649,991
June	38,340	36,623	320,470	55,581	171,303	51,770	74,744	66,043	648,579
July	46,880	36,384	330,528	49,018	174,227	49,958	71,300	79,719	655,154
August ...	38,665	39,242	329,548	47,724	177,250	46,482	77,831	80,620	659,851
September.	34,569	37,553	326,236	43,413	174,894¶	33,872	74,130	71,290	640,675
October ...	34,356	42,436	317,850	49,913	168,570	37,597	74,255	70,773	627,363
November .	28,826	42,778	303,162	46,588	166,896	32,597	64,274	63,621	595,717
December .	34,596	42,942	295,438	39,094	164,295	28,304	61,835	79,123	575,720
1936									
January ...	31,292	48,506	276,372	43,870	162,107	31,195	61,158	....	556,170
February ..	35,219	36,746	273,284	46,532	.....	.....	.....	.....	.....

* Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, and afloat. ¶Including an adjustment of 2,650 tons for loss by fire at Colonial Wharf.

CRUDE rubber consumption by United States manufacturers for February, 1936, is estimated at 36,746 long tons, against 48,506 long tons for January, approximately 24.2% below the January figure and 14.9% below the February, 1935, figure of 43,187 long tons, according to the R.M.A.

Imports of crude rubber for February totaled 35,219 long tons, 12.5% above the January figure of 31,292 long tons, and practically no change as compared with 35,383 long tons imported in February, 1935.

Total domestic stocks of crude rubber on hand February 29 are estimated at 273,284 long tons, compared with January 31 stocks of 276,372 long tons and 339,335 long tons on hand February 28, 1935.

Crude rubber afloat to United States ports on February 29 is estimated at 46,532 long tons as compared with 43,870 long tons afloat on January 31 and 42,969 long tons afloat on February 28, 1935.

London and Liverpool Stocks

Week Ended	Tons	
	London	Liverpool
Feb. 29.....	79,655	77,200
Mar. 7.....	77,548	77,341
Mar. 14.....	77,066	74,855
Mar. 21.....	76,081	74,328

OHIO

(*Continued from page* 56)

The order ends one of the most important cases ever to come before the Federal Trade Commission. The Commission's formal complaint against the Goodyear Tire & Rubber Co., issued under Section 2 of the Clayton Act, was ordered on September 13, 1933, and was made public on October 18, following. Hearings were held for the taking of testimony in a number of cities, including Washington and Akron. Some months after issuance of the complaint, Goodyear attorneys entered a motion to dismiss it on the ground that the evidence had failed to show the violation of the Clayton Act charged in the complaint. This motion was overruled by the Commission on June 22, 1934, and the taking of testimony was resumed. Final argument was heard by the Commission in Washington on January 14 and 15, last, at the conclusion of which the Commission took the matter under advisement.

Paul W. Litchfield, Goodyear president, declared the company would appeal this decision to the federal courts.

Strike Settled

After being shut down since mid-February because of strike pickets and attendant actual and threatened violence the Goodyear plants were reopened March 22, the day after the United Rubber Workers of America voted to accept a seven-point agreement by the company. Maintenance and office employes went to work first; production hands were summoned as their departments were put in order ready to receive them. In all about 14,000 workers returned. The great majority of these were not strikers, but were prevented from working by the picketing.

National Rubber Machinery Co., maker of equipment for rubber manufacturers, Akron, has announced that S. A. Fraine, with the company since 1925 as a sales and development engineer, recently returned from England after spending about three years in Europe introducing the National line of rubber processing machinery as well as supervising its manufacture at David Bridge & Co., Ltd., Manchester, England, National's manufacturing agent in England and other European countries.

S. A. Fraine

Mr. Fraine is now devoting his efforts to sales and development work for National in the United States.

The Polson Rubber Co., Garrettsville, equaled 1929 sales in 1935, and President H. B. Polson predicts 1936 will be the company's banner year, with a production of half a million inner tubes. The company employs 100 persons daily. Current production is 4,000 tubes a day. The plant, which once housed the old McWade Tire & Rubber Co., was purchased by the Polson company ten years ago. The latter firm, organized in Kansas City in 1909, first manufactured tire accessories. One of the pioneers in the field, the company first started manufacturing puncture sealing tubes when it moved to Garrettsville. R. D. Woolery is secretary-treasurer.

E. V. Carlquist, recently advertising manager of the Thermoid Co., Trenton, has joined Fuller & Smith & Ross, Cleveland office, as account executive.

Belgian Congo. The 1924 report of the U. S. Department of Commerce estimated 6,000 acres under *Hevea* in Belgian Congo. The 1933 trade report of the Congo shows 90 tons of plantation rubber exported in 1932 and 135 tons in 1933, so that plantations in the Haut-Congo remained active during the pit of the depression. All exports go directly to Belgium.

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Classified Advertisements

Continued

SITUATIONS OPEN—Continued

LATEX CHEMIST FOR DEVELOPMENT WORK IN LABORATORY and field. Write full details, age, education, experience, married or single, salary, etc. Address Box No. 643, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

YOUNG MAN (BRITISH) LOCATED LONDON, ENGLAND, WITH sales experience rubber business, would like to connect with good rubber technician with view manufacturing partnership. Financial participation desirable though not essential. Minimum salary and engagement would be guaranteed. Apply in first instance to "Rubber," care P. O. Box 26, Wall St. Postal Station, New York City.

ESTABLISHED RUBBER BROKER, HAVING INTIMATE CONtact with rubber factories, would like to handle additional lines acceptable to the rubber industry in New England. Storage facilities available. Address Box No. 638, care of INDIA RUBBER WORLD.

WANTED: FINANCIAL BACKING FOR MANUFACTURE OF new type latex products including footwear. Large market assured. Address Box No. 642, care of INDIA RUBBER WORLD.

Chemistry is the BASE on which all successful Rubber Manufacturing MUST be founded. I can supply that base to you as I have to many others.

FREDERICK J. MAYWALD, F. C. S.

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"DU PRENE can be loaded with FACTICE and fillers to a greater extent than rubber and yet retain its rubber-like properties to a remarkable degree. Such stocks tube smoothly and rapidly, calender nicely at low heats and, when vulcanized, give snappy, rubbery stocks."

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THE STAMFORD RUBBER SUPPLY CO. STAMFORD CONN.

Makers of FACTICE Since 1900

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(*Advertisements continued on page* 89)

Synthetic Plastics

(*Continued from page* 40)

them is something to marvel at. Agonized cries are momentarily expected from British suppliers or labor.

Formica panels are used in the *Queen Mary's* public rooms, cabins, bathrooms. All tables in the public rooms, many tables and dressers in the cabins are of this plastic. The panels are heat-resistant to a high degree. Table tops won't discolor from highball spillage or cigarettes. Even the charred spot at the edge of table is circumvented by a thin sub-surface sheet of metal foil which distributes the heat through the entire area of the top, thereby preventing burns.

A dramatic experiment in behalf of vinyl resins was made for the Chicago Fair by the Carbide & Carbon Chemicals Corp., in cooperation with the Pierce Foundation, New York. A modern apartment of living room, bathroom, kitchen was completed, the plastic being used wherever possible in construction and furnishings. Doors were made in a single piece by molding Vinylite over a fireproof pulp board. The molded wall panels were reenforced by steel rods. Vinylite tile for the floors was made by Johns-Manville in equipment used for asphalt tile. Light from the windows and electric bulbs came through sheets of Vinylite. Almost everything in the apartment, including ornaments, was of Vinylite; exceptions were plumbing fixtures, furniture, gas stove, bath tub.

Produce Hinged Doors

This was an experiment in the architectural use of resins. One result was the development of a technique for continuous production of doors complete with hinges. Such doors need no fitting, require only the addition of knobs and locks. They won't warp, are light and permanently beautiful. Wide use of synthetic resin in architectural shapes is expected when larger-scale operations permit the lowering the cost of the product.

It would take a directory to list the thousands of ways in which plastics have entered industrial and consumer goods during the past few years. Apparently no field of industry is immune from the invasion.

Plastics are found in airplanes (an important item being laminated propellers). The very earthworms encounter it since du Pont has developed a cellulose cover for underground pipe which is said to be entirely impervious to water.

U. S. Crude and Waste Rubber Imports for 1936

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Totals 1936	Totals 1935	Balata	Miscellaneous	Waste
Jan. .....tons	29,130	1,263	597	167	65	70	..	31,292	42,059	20	870	122
Feb.	33,203	1,146	550	217	28	75	..	35,219	35,383	95	665	184
Total 2 mos., 1936 .....tons	62,333	2,409	1,147	384	93	145	..	66,511	.....	115	1,535	306
Total 2 mos., 1935 .....tons	74,910	987	1,409	44	92	..	..	.....	77,442	99	747	29

Compiled from The Rubber Manufacturers Association, Inc., statistics.

United States Latex Imports

Year	Pounds	Value
1931	10,414,712	$884,355
1932	11,388,156	601,999
1933	24,829,861	1,833,671
1934	29,276,134	3,633,253
1935	30,358,748	3,782,222
1936		
Jan.	3,733,665	474,682

Data from Leather and Rubber Division, United States Department of Commerce, Washington, D. C.

World Net Imports of Crude Rubber

Year	U.S.A.	U.K.	Australia	Belgium	Canada	Czechoslovakia	France	Germany	Italy	Japan	Russia	Rest of the World	Total
1933	398,400	73,300	13,500	11,200	19,300	10,400	63,100	54,100	19,300	66,900	30,800	38,600	798,900
1934	438,900	158,500	9,600	9,100	28,400	11,000	50,400	59,300	21,400	69,900	47,300	55,600	959,400
1935													
Jan.	39,546	20,383	1,099	419	2,670	1,245	5,678	4,286	1,648	4,402	3,446	4,394	89,216
Feb.	45,999	15,609	848	399	1 558	1,836	4,670	3,513	4,357	5,585	1,810	4,310	90,494
Mar.	44,772	12,810	1,458	240	2,710	736	4,085	6,353	1,582	4,423	4,624	4,319	88,112
Apr.	40,061	11,574	1,150	520	1,063	789	3,368	5,820	1,653	6,635	3,387	4,241	80,261
May	29,962	12,498	671	982	3,929	774	3,900	6,050	935	5,432	1,937	4,473	71,543
June	31,410	10,253	496	1,065	1,435	605	3 270	4,551	1,831	3,375	3,088	4,664	66,043
July	47,694	9,454	520	572	1,319	185	3,308	4,929	1,298	4,486	1,823	4,131	79,719
Aug.	41,057	14,120	655	527	2,814	661	4,593	4,790	916	4,454	1,227	4,806	80,620
Sept.	35,256	11,223	449	807	1,604	912	3,810	5,453	1,696	3,591	1,593	4,896	71,290
Oct.	35,770	3,184	829	539	812	742	5,272	6,074	2,500*	4,729	4,876	5,446	70,773
Nov.	25,756	2,942	783	449	4,389	1,276	4,820	6,259	2,500*	4,363	4,859	5,225	63,621
Dec.	38,072	4,779	1,013	1,074	2,565	1,464	5,626	4,823	3,000*	6,114	4,906	5,681	79,123

* Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Shipments of Crude Rubber from Producing Countries

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Siam	French Indo-China	Philippines Total	Philippines and Oceania	Africa	South America	Mexican Guayule	Grand Total
1933	445,800	282,300	63,800	1,400	3,400	7,800	11,100	7,000	17,300	839,900	1,100*	2,000	10,100	0	853,100
1934	467,000	379,400	79,100	5,700	5,700	11,100	17,700	17,700	19,600	1,003,000	1,200*	2,900	9,100	400	1,016,600
1935															
Jan.	41,665	18,726	6,294	1,595	945	1,238	1,536	2,614	2,575	77,188	105	467	1,785	0	79,545
Feb.	32,824	28,019	5,551	344	488	760	1,880	2,288	2,018	74,172	156	254	926	0	75,508
Mar.	34,047	22,402	1,720	269	471	773	1,874	2,076	1,440	65,072	82	525	992	0	66,671
Apr.	37,442	26,156	3,749	250	263	846	1,875	1,661	2,827	75,069	134	185	1,146	0	76,534
May	27,740	36,289	4,473	322	484	848	1,977	2,752	1,800	76.685	134	315	756	50	77,940
June	31,198	29,337	3,525	797	383	603	1,983	2,869	2,516	73,211	142	393	895	103	74,744
July	37,826	20,990	4,106	556	229	1,164	1,752	1,729	1,957	70,309	125	407	407	52	71,300
Aug.	40,990	21,154	5,683	732	102	566	772	2,328	3,662	75,989	143	442	1,207	50	77,831
Sept.	40,984	20,447	4,053	561	120	421	1,758	1,949	2,248	72,541	94	441	1,037	17	74,130
Oct.	29,007	28,162	5,932	939	259	1,040	1,684	2,679	2,751	72,453	180	319	1,260	43	74,255
Nov.	32,734	17,434	4,288	1,284	563	455	1,141	2,303	2,406	62,608	123	524	956	63	64,274
Dec.	30,434	13,811	4,942	1,136	1,187	171	1,233	3,079	3,793	59,786	119	500*	1,349	81	61,835
1936															
Jan.	26,644	19,532	4,131	419	587	938	2,317	1,665	2,449	58,682	130*	500*	1,776	70*	61,158

*Estimate. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

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CONTINENTAL RUBBER COMPANY OF NEW YORK
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Classified Advertisements

Continued

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MACHINERY AND SUPPLIES WANTED

SECOND-HAND THREAD CALENDER AND CUTTING MACHINE required. Must be in first-rate condition. Address Box No. 631, care of INDIA RUBBER WORLD.

EQUIPMENT WANTED: 16" MIXING MILL; 6" TUBING MAchine; Calenders, Churns, etc., requiring good equipment, rock-bottom price. Post Office Box 151, Dunkirk, N. Y.

MISCELLANEOUS

WANTED: LARGE QUANTITIES OF GOODYEAR TRANSPARENT floating auto tire tubes, also mixed floating tubes without metal and crusty. Submit offers to Box No. 633, care of INDIA RUBBER WORLD.

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Book Reviews

(*Continued from page 79*)

"Rubber Producing Companies — 1935." Compiled by the Mincing Lane Tea & Rubber Share Broker's Association, Ltd., 14 Mincing Lane, London, E.C.3, England. Published by *The Financial Times*, 72 Coleman St., London, E.C. Boards, 578 pages, 5 by 8 inches. Indexed. Price 7 shillings 6 pence.

This standard work follows the lines of previous editions. The authentic and exhaustive information concerning nearly six hundred companies, includes capital, acreage, latest accounts, crops, purchase price, dividends, forward sales, estimates, etc. Particulars are also given of many companies with tea and coffee interests, also a list of company secretaries.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	December, 1935		Nine Months Ended December, 1935	
UNMANUFACTURED	Pounds	Value	Pounds	Value
Crude rubber, etc.	5,745,825	$677,659	44,645,757	$5,103,305
Gutta percha	2,261	2,219	17,048	8,535
Rubber, recovered	682,500	30,663	5,652,800	266,663
Rubber, powdered, and gutta percha scrap	258,700	2,753	2,299,100	29,727
Balata	824	745	8,935	2,087
Rubber substitute	41,000	7,394	332,500	95,232
Totals	6,731,110	$721,433	52,956,140	$5,505,549
PARTLY MANUFACTURED				
Hard rubber sheets and rods	1,948	$1,646	20,231	$16,118
Hard rubber tubes	.....	594	.....	4,262
Rubber thread not covered	5,141	3,329	38,462	24,914
Totals	7,089	$5,569	58,693	$45,294
MANUFACTURED				
Hard rubber comb blanks	.....	$4,464	.....	$10,461
Belting	.....	3,321	.....	60,283
Hose	.....	5,991	.....	61,986
Packing	.....	4,730	.....	46,389
Boots and shoes, *pairs*	89,073	69,659	445,736	311,565
Clothing, including waterproofed	.....	510	.....	15,071
Raincoats, *number*	126	660	5,939	24,145
Gloves, *dozen pairs*	68	344	1,949	4,904
Hot water bottles	.....	149	.....	12,105
Liquid rubber compound	.....	1,952	.....	9,673
Tires, bicycle, *number*	1,421	559	37,740	16,552
Pneumatic, *number*	395	4,465	13,933	122,478
Inner tubes, *number*	32	148	2,562	6,175
Solid for automobiles and motor trucks, *number*	21	687	291	8,892
Other solid tires	.....	807	.....	5,873
Mats and matting	.....	5,779	.....	66,086
Cement	.....	2,669	.....	66,031
Golf balls, *dozen*	115	241	31,054	84,608
Heels, *pairs*	11,668	661	67,359	4,043
Other rubber manufactures	.....	49,464	.....	598,392
Totals	.....	$157,260	.....	$1,535,712
Totals, rubber imports	.....	$884,262	.....	$7,086,555

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
UNMANUFACTURED				
Waste rubber	$5,415	.....	$48,531	.....
MANUFACTURED				
Belting	$33,115	.....	$406,209	.....
Canvas shoes with rubber soles	17,195	.....	743,414	.....
Boots and shoes	268,641	.....	1,739,553	.....
Clothing, including waterproofed	13,254	.....	152,412	.....
Heels	15,356	.....	142,626	.....
Hose	9,962	.....	125,178	.....
Soles	14,400	.....	159,305	.....
Tires, bicycle	85	.....	484	.....
Pneumatic	480,223	.....	4,834,966	.....
Inner tubes	43,067	.....	355,692	.....
Solid	.....	.....	19	.....
Other rubber manufactures	41,962	$1,278	431,313	$14,105
Totals	$937,260	$1,278	$9,091,171	$14,105
Totals, rubber exports	$942,675	$1,278	$9,139,702	$14,105

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	COMMODITY	CITY AND COUNTRY
†140	Rubber thread for elastic fabrics	St. Etienne, France
*156	Tube patches for vulcanizing	Mexico City, Mexico
†170	Surgical rubber goods	Calcutta, India
†242	Rubber goods	Brussels, Belgium
†260	Footwear	Bogota, Colombia
†293	Boots, shoes, dress shields, mats, and tubing	Tel-Aviv, Palestine
†304	Rubber thread for elastic fabrics	Lyon, France
*310	Three-ply, rubber-faced canvas	Sifton, Canada
*325	Cotton covered rubber thread for elastic fabrics	Astene-Deynze, Belgium
*330	New tires and tire casings for retreading	Arnhem, Netherlands
*346	Tubing	Brussels, Belgium
†351	Garden hose	Scheveningen, Netherlands
†352	Rubber fly swatters	Scheveningen, Netherlands
*383	Washers, tank bulbs, faucet caps, etc.	Windsor, Canada
*393	Hard rubber comb blanks	Milnthorpe, England
†394	Druggists' sundries and hospital supplies	Havre, France
‡409	Surgical goods	Cairo, Egypt

*Purchase. †Agency. ‡Purchase and agency.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	INQUIRY
2059	Manufacturer of rubber compounding pigment AFX.
2060	Manufacturer of sponge rubber balls.
2061	Manufacturer of inflated rubber balls.
2062	Wanted: catalogs, illustrations, and samples of rubber flooring.
2063	Supplier of Linatex.
2064	Manufacturer of small rubber knobs as used on steel sash pull chains.
2065	Manufacturer of Berstorff continuous vulcanizer.
2066	Supplier of purified, precipitated balata.
2067	Manufacturer of "Synthetic Balata."
2068	Wanted: technical information on synthetic rubber.
2069	Supplier of Rubberphane.
2070	Supplier of litharge.
2071	Supplier of wax.
2072	Supplier of zinc oxide.
2073	Supplier of carbon.
2074	Supplier of D.P.G.
2075	Supplier of sulphur.
2076	Supplier of lithopone.
2077	Supplier of barytes.
2078	Supplier of whiting.
2079	Supplier of China clay.
2080	Supplier of reclaimed rubber.
2081	Supplier of heavy magnesium.
2082	Supplier of carbonate.
2083	Supplier of mineral rubber.
2084	Supplier of shoe varnish.

THE STANDS OF PLANTED HEVEA OUTSIDE THE RESTRICTION AREA (FROM which exports of seeds, seedlings, budwood, etc., are prohibited under the International Agreement), are quite widely scattered and are located one-third in British possessions and two-thirds elsewhere roughly estimated. Of these areas 10% are in tropical America, 77% in Africa, and 13% in the Pacific area.

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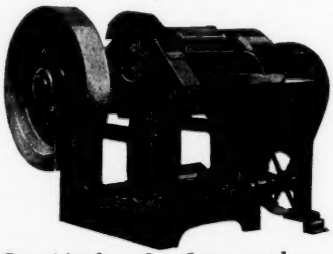

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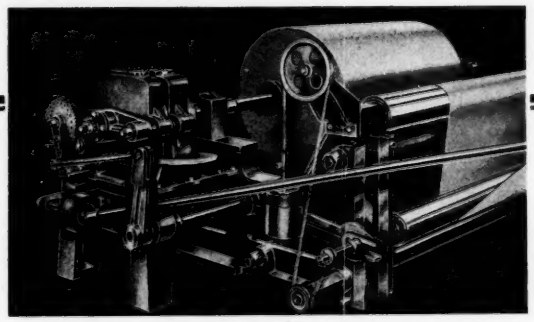

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United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	December, 1935		Twelve Months Ended December, 1935	
UNMANUFACTURED—*Free*	Pounds	Value	Pounds	Value
Crude rubber	86,054,435	$9,930,710	1,015,020,761	$115,299,448
Liquid latex	3,125,321	391,386	30,358,748	3,782,222
Jelutong or pontianak	927,406	71,885	12,643,496	1,063,126
Balata	139,159	18,269	1,377,273	188,384
Gutta percha	284,756	30,340	3,588,728	513,652
Guayule	182,000	15,317	1,028,400	86,835
Scrap and reclaimed, etc.	1,091,052	11,395	8,842,655	107,345
Totals	91,804,129	$10,469,302	1,072,860,061	$121,041,012
Chicle, crude *Free*	1,725,947	$512,009	7,775,221	$1,887,171
MANUFACTURED—*Dutiable*				
Rubber soled footwear with fabric uppers *pair*	142,594	$36,395	933,600	$235,061
Rubber toys	80,703	11,862	1,315,302	167,413
Druggists' sundries, n. e. s.	.....	4,563	.....	82,000
Combs, hard rubber *number*	70,836	4,277	809,136	46,121
Golf balls *number*	4,320	714	535,841	90,964
Tennis and other rubber balls *number*	212,793	4,992	3,452,329	154,603
Tires *number*	720	1,188	39,378	75,522
Other rubber manufactures	.....	36,106	.....	414,709
Totals	.....	$100,097	.....	$1,266,393

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber	4,078,130	$523,997	25,511,581	$3,084,331
Balata	2,732	692	175,166	42,804
Gutta percha, rubber substitutes, and scrap	.....	.....	44,503	7,879
Rubber manufactures	.....	226	.....	18,105
Totals	.....	$524,915	.....	$3,153,119

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed	1,237,474	$59,561	12,054,818	$584,037
Scrap	4,974,310	114,974	57,599,947	1,158,678
Rubberized automobile cloth, *sq. yd.*	42,954	18,177	538,090	262,623
Other rubberized piece goods and hospital sheeting *sq. yd.*	90,007	38,985	1,103,579	449,029
Footwear				
Boots *pairs*	4,420	10,853	86,037	188,553
Shoes *pairs*	12,172	8,564	161,754	88,355
Canvas shoes with rubber soles *pairs*	13,695	7,451	475,002	229,367
Soles *doz. prs.*	1,717	3,488	31,703	51,179
Heels *doz. prs.*	35,528	21,224	448,399	256,292
Soling and top lift sheets	43,683	7,024	306,539	57,981
Water bottles and fountain syringes *number*	10,788	3,830	223,630	77,437
Gloves *doz. prs.*	7,881	14,870	62,655	131,515
Other druggists' sundries	.....	27,404	.....	381,911
Balloons *gross*	24,420	18,905	250,654	217,605
Toys and balls	.....	6,165	.....	95,513
Bathing caps *doz.*	1,992	2,393	52,957	89,732
Bands	19,375	6,801	219,695	76,483
Erasers	24,686	13,447	358,524	198,770
Hard rubber goods				
Electrical goods	123,133	10,804	1,784,593	169,875
Other goods	.....	22,097	.....	232,218
Tires				
Truck and bus casings, *number*	11,619	209,702	174,544	3,287,094
Other automobile casings, *number*	44,635	442,837	728,729	6,524,606
Tubes, auto *number*	46,439	71,135	633,504	921,159
Other casings and tubes, *number*	4,627	9,711	45,739	169,279
Solid tires for automobiles and motor trucks *number*	204	7,369	4,939	145,693
Other solid tires	156,578	20,749	1,099,714	152,826
Tire sundries and repair materials	.....	39,051	.....	433,333
Rubber and friction tape	58,614	13,743	582,051	158,918
Belting	218,834	98,688	2,639,558	1,272,162
Hose	379,491	121,784	4,042,929	1,245,736
Packing	131,821	46,735	1,561,484	542,620
Thread	124,595	94,134	1,154,959	713,978
Other rubber manufactures	.....	103,934	.....	1,583,050
Totals	.....	$1,696,589	.....	$22,147,607

U. S. Golf Ball Imports

	United Kingdom		All Other		Total	
	No.	$	No.	$	No.	$
January, 1936	4,080	969	..	..	4,080	969
August, 1935	79,340	11,285	36	12	79,376	11,297
September	32,472	5,755	..	..	32,472	5,755
October	14,208	2,253	360	45	14,568	2,298
November	8,160	1,252	..	..	8,160	1,252
December	4,320	714	..	..	4,320	714

Rubber Goods Production Statistics

	1935	1934
TIRES AND TUBES*	Dec.	Dec.
Pneumatic casings		
Production *thousands*	3,282	3,665
Shipments, total *thousands*	3,365	3,015
Domestic *thousands*	3,311	2,921
Stocks, end of month *thousands*	6,639	9,171
Solid and cushion tires		
Production *thousands*		
Shipments, total *thousands*	23	15
Domestic *thousands*	23	14
Stocks, end of month *thousands*	41	35
Inner tubes		
Production *thousands*	3,279	3,398
Shipments, total *thousands*	3,268	2,765
Domestic *thousands*	3,229	2,689
Stocks, end of month *thousands*	6,667	8,904
Raw material consumed		
Fabrics *thous. of lbs.*	13,632	15,627
MISCELLANEOUS PRODUCTS		
Rubber bands, shipments *thous. of lbs.*	363	174
Rubber-proofed fabrics, production, total *thous. of yds.*	2,760	3,334
Auto fabrics *thous. of yds.*	313	744
Raincoat fabrics *thous. of yds.*	604	884
Rubber flooring, shipments *thous. of sq. ft.*	450	411
Rubber and canvas footwear		
Production, total *thous. of prs.*	5,993	4,870
Tennis *thous. of prs.*	1,661	1,570
Waterproof *thous. of prs.*	4,332	3,300
Shipments, total *thous. of prs.*	6,276	5,317
Tennis *thous. of prs.*	830	1,258
Waterproof *thous. of prs.*	5,446	4,060
Shipments, domestic, total *thous. of prs.*	6,252	5,273
Tennis *thous. of prs.*	815	1,240
Waterproof *thous. of prs.*	5,437	4,033
Stocks, total, end of month *thous. of prs.*	14,967	15,177
Tennis *thous. of prs.*	6,743	6,999
Waterproof *thous. of prs.*	8,224	8,178
Rubber heels		
Production *thous. of prs.*	16,649	13,428
Shipments, total *thous. of prs.*	17,094	14,075
Export *thous. of prs.*	348	359
Repair trade *thous. of prs.*	2,829	3,435
Shoe manufacturers *thous. of prs.*	13,917	10,281
Stocks, end of month *thous. of prs.*	30,374	37,751
Rubber soles		
Production *thous. of prs.*	3,698	3,400
Shipments, total *thous. of prs.*	3,544	3,592
Export *thous. of prs.*	1	3
Repair trade *thous. of prs.*	401	530
Shoe manufacturers *thous. of prs.*	3,142	3,059
Stocks, end of month *thous. of prs.*	3,164	4,329
Mechanical rubber goods, shipments		
Total *thous. of dollars*	5,200	3,601
Belting *thous. of dollars*	1,027	746
Hose *thous. of dollars*	1,408	1,001
Other *thous. of dollars*	2,765	1,854

*Data for 1934 and for January to July, 1935, are estimated to represent approximately 97% of the industry; for August, September, October, November, and December, 1935, the coverage is estimated to be 81%.
Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	8% Pfd.	$2.00 q.	Apr. 1	Mar. 17
Collyer Insulated Wire Co.	Com.	$0.15 q.	Apr. 1	Mar. 26
Dominion Rubber Co., Ltd.	Pfd.	$1.75 q.	Mar. 31	Mar. 20
Firestone Tire & Rubber Co.	Com.	$0.30 q.	Apr. 20	Apr. 3
Fisk Rubber Corp.	Pfd.	$1.50 q.	Apr. 1	Mar. 12
Garlock Packing Co.	Com.	$0.25 q.	Mar. 31	Mar. 21
Garlock Packing Co.	Com.	$0.12½ ex.	Mar. 31	Mar. 21
General Tire & Rubber Co.	6% Pfd.	$1.50 accum.	Mar. 31	Mar. 20
Goodyear Tire & Rubber Co. of Calif.	7% Pfd.	$0.50 accum.	Apr. 1	Mar. 25
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	$0.62 q.	Apr. 1	Mar. 14
Goodyear Tire & Rubber Co. of Canada, Ltd.	5% Pfd.	$0.62½ q.	Apr. 1	Mar. 14
Plymouth Rubber Co.	Pfd.	$1.75 q.	Apr. 15	Apr. 1
Rex-Hide, Inc.	Com.	$0.25 q.	Apr. 15	Mar. 31
U. S. Rubber Reclaiming Co.	8% Pr. Pfd.	$1.00 accum.	Mar. 17	Feb. 1

Imports by Customs Districts

	January, 1936 *Crude Rubber		January, 1935 *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	8,979,810	$1,088,849	6,055,532	$798,593
Buffalo	56,000	5,740	.....	.....
New York	54,740,061	6,622,836	71,501,886	8,724,659
Philadelphia	2,168,012	273,174	2,536,839	310,771
Maryland	85,220	10,970	1,194,817	144,007
New Orleans	766,205	95,882	1,448,891	163,894
Los Angeles	8,854,478	957,409	7,788,043	969,517
San Francisco	293,515	37,684	106,459	11,879
Oregon	11,200	1,410	.....	.....
Ohio	185,578	17,970	139,523	16,571
Totals	76,140,079	$9,111,924	90,771,990	$11,139,891

*Crude rubber including latex dry rubber content.